Extension work IN U.S.A. & JAPAN

S. K. Dev

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This series of textbooks is being published by the Directorate of Extension and Training, Ministry of Food and Agriculture, Department of Agriculture, Government of India with the object of providing in a handy form detailed information on the various subjects taught in the Training Institutions working under the guidance of the Directorate. Written by well-known authorities in simple non-technical language and based on the proven results of research, these textbooks, it is hoped, will be of interest and benefit not only to the Extension trainees and instructors but also to the larger circle of agricultural students and general readers.

Editor

D. M. ANAND, M.A. (OXON)
Deputy Director (Information)

EXTENSION WORK IN U.S.A. AND JAPAN

SACHINDRA KUMAR DEY, M.A., B.Sc. (Wales)
DIRECTOR OF EXTENSION & TRAINING
Ministry of Food and Agriculture
Government of India

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FOREWORD

The strength of a nation depends fundamentally on the soundness of its rural structure and economy. The village is the basic factor and it is in the village, however small, that we must lay the foundations of a strong nation. If democracy is to mean anything substantial, it has to have its roots in the village. It may be possible to administer and maintain law and order from the top but it is impossible to build a strong and prosperous nation without sound grass roots in the village.

It was this truth which was vitally realised by the Father of the Nation, Mahatma Gandhi, when he remarked that India lives in its villages. Mahatmaji's village *panchayats*, the sound organisations, which our forefathers once built, the autonomous villages that our friends in Japan have evolved, are the fundamental answer to the problem of nation building.

In this task of building our rural economy, we can learn much from the successful experiences of others. Two great nations, in a relatively short span of years, have achieved spectacular results in this field. They are the U.S.A. and Japan. I am, therefore, grateful to the Ford Foundation for the generous help which enabled me to obtain firsthand experience of the excellent work in the Extension sphere which is being done in these two countries. There is perhaps nothing very startlingly new in the information which is presented in this report. Nevertheless, I venture to hope that the facts, which have been brought together in these pages, may be of some interest to the Extension workers in India and may perhaps provide them with some useful ideas to be tried out and adopted in their own programmes.

This report, in its revised printed form, is mainly due

to the constant encouragement and inspiration given by Mr K. Sen, I.C.S., Secretary to the Government of West Bengal, Department of Agriculture and in fulfilment of his wish. I cannot, therefore, adequately express my gratitude for all his support and appreciation.

My thanks are also due to Mr D. M. Anand, M.A. (Oxon) of the Directorate of Extension and Training, who has very ably edited this report and has taken great pains to see it through the press.

November, 1957 S. K. D.

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PART I

THE UNITED STATES OF AMERICA

THE LAND OF PROSPERITY AND PLENTY ● THE PEOPLE OF VIGOUR AND IDEAS ● THE GREAT NATION OF DEMOCRATIC WELL-TO-DO MIDDLE CLASS THAT HAS GROWN TO ITS PRESENT HEIGHT OF SUCCESS THROUGH COMBINES AND COMMUNITIES IN SPITE OF INDIVIDUAL ENTERPRISE AND COMPETITION

Itinerary, Agricultural Background, The T. V. A., The United States Department of Agriculture, The Extension Service—its Philosophy, Organisation, Principles, Methods and Activities.

"It is not the earth, It is not America who is so great,
It is I who am great or to be great, it is you up there,
or anyone."

Walt Whitman

THE ITINERARY

The object of the tour was to study 'Extension Methods' practised in the United States of America and in Japan, so that, they may be adopted and applied, as far as practicable, to India, with the object of introducing improved methods of agriculture and thus attaining increased production of food and raising the standard of living of rural India.

The study covered the period from 19th August, 1952 to 14th November, 1952. The period, 22nd August, 1952 to 22nd October, 1952, was spent in the United States of America, and from 25th October to 11th November the delegation was in Japan. The delegation arrived in New York on the 22nd August via Basra, Beirut, Rome, Paris and Shannon; the return journey from the United States of America was via Honolulu to Japan; and then to India via Hong Kong and Bangkok.

After orientation in New York and the United States Department of Agriculture at Washington, the States of Tennessee, Alabama, Missouri, New Mexico, Arizona and California, Maryland University, University of Tennessee, Auburn Polytechnic Institute, Tuskegee Institute, University of Missouri, University of Arizona, University of California, and a large number of farms, rural homes, and community centres, several research stations and experimental farms were visited. A special study was made of the Negro problems, Extension activities at the Tuskegee Institute, the Extension activities in the Red Indian Concentrations, and the underdeveloped Spanish American villages. Considerable time was spent in the Tennessee Valley Area, where the utilisation of water and electricity and the activities of the Community Centres were studied. The soil conservation work of the Production and Marketing Agency, the Rural Credit System, the rural electrification work, co-operative marketing,

land reclamation work, mechanization in dairy industry and crop husbandry, home improvement principles, afforestation, fish culture, etc. were studied under the guidance of the Tennessee University Authorities. Direct study of the method of work in the County Extension Office, the activities of the County Agents in the farms and the rural organisations and that of the Home Demonstration Agents in the rural homes were also studied. The programme followed in the United States of America is given below in brief.

The 'Maple Lawn Farm' owned by Mr and Mrs Lager both of whom were '4-H Club' members, deserves special mention. The 60-acre farm specializes in the production of about 300 broad breasted turkeys, 3,000 chickens, eggs from a flock of 600 to 800 laying hens and milk from about 36 cows. Principal crops are grass for pasture and hay, corn and alfalfa. The farm has two tractors, a 'Walk-in-Freezer-Locker' for preservation and future sale, milking machines, hay dryer, etc. Mr Lager manages the farm with the help of only three paid labourers. Mrs Lager keeps accounts and books, while their two sons, Charles and Eugene, assist in the feeding and rearing of poultry. Artificial insemination is used with about 71% success. The elder boy, Charles, is a keen '4-H' member with special interest in dairy.

The farm of Mr William M. Zeltman at Pfeiffers Corner also deserves mention. The family consisted of Mr and Mrs W. M. Zeltman; Raymond, aged 21; Mary Ellen, aged 16; and William Jr., aged 24. Mr Zeltman and his eldest son; William Jr., worked off the farm as carpenters; Raymond, an enthusiastic '4-H Club' member, his mother and his sister, operated the 120-acre farm. Raymond had been an outstanding '4-H Club' member and had won many prizes. The farm has 20 milch cows, 20 heifers and 3 bulls. It has also a tractor. Raymond did all the farm work with one helper. Pasture, hay, corn and barley were the main crops. Mary Ellen, his sister, is a '4-H Club' member in Dairy and Home making, and helped in the dairy, while Mrs Zeltman was credited with the improvements in the home, the modernization of the kitchen equipments, and preservation

of food. Another interesting institution visited was the Howard County Co-operative Institution, which specializes in frozen foods in its 1,100 Frozen Food-lockers. The Co-operative has 600 stockholders. It was started through the sale of stock and a loan obtained from the Bank of Co-operatives supervised by the Farm Credit Administration of the United States Department of Agriculture.

Several County Extension Offices were visited. Most of the County Extension Offices consisted of only three or four persons : County Agent; Asst. County Agent; Home Demonstration Agent; and Office Secretary, who handled all correspondence, accounts, budget, library, reports and returns, typing, etc. for the office single handed.

The record of a county showed that the county had 1,037 farms and 1,400 farm families, 16 Home Demonstration Clubs with 204 members, 13 Boys' 4-H Clubs with 274 members and senior 4-H County Council with 40 members.

At the Universities the organisation and operation of the Extension Service, relation and contact with research, its activities regarding the Community Clubs for men and women and 4-H Clubs, and the manner in which the rural people participate in the development and execution of an Extension programme were studied. The community development programme, its relationships to sound farm and home programmes, the effect of cheap power, small industries and handicrafts on the income, health and attitude of families, and the manner in which Extension teaches through meetings, demonstrations, local organisations were also examined. Tennessee Valley Area, the Washburn Community Centre, a few rural homes, Community School, the Norris Dam, the Cherokee Reservoir, the Aluminium Company of America at Alcoa, the Bemberg Rayon Corporation plant, the Bowater Paper Company and its utilization of waste lands by afforestation and production of paper—the large industrial enterprises where the Tennessee Valley Area farmers and rural population obtain part time occupation—test demonstration farms, the Appalachian Co-operative Electric Company, the Chattanooga Milk Producers Co-operative

Association, the Tennessee Burly Tobacco Growers Association, and several privately owned farms were visited.

The 23-acre small Gleason Farm also deserves mention. Mr Gleason is an electrician at the Rayon Factory. His 23-acre farm has a tractor and other equipment, including a grain and seed combine. He has a renter, who gets ½ of the tobacco crop for his labour, while Mr Gleason furnishes seed, fertilizer and equipment. The renter also works for other crops, operates the tractor, a grain and seed combine, with the help of his 14-year old son for which they are paid 50 cents and 25 cents per hour respectively.

The Tennessee Burly Tobacco Growers Association is another institution of interest. It has a co-operative membership of 80,000 farmers who have paid a life membership fee of $ 1.00 each. The Association began in 1936 and is functioning effectively since 1945. The Association co-operates with the Government in the Tobacco price control programme. All tobacco is inspected and graded by a Government Inspector, who establishes the grades. Any member who fails to sell his tobacco at or above the control price is bought out by the association, and the tobacco is re-conditioned and stored until it can be sold advantageously. The money needed to finance this programme is borrowed from the Commodity Credit Co-operative at 3½% interest. The savings through redrying usually amount to about 4% per pound on the tobacco handled. Farmers who sell to private dealers individually lose this saving. Sale of tobacco through co-operative or directly is voluntary. The Association is controlled by a Board of Directors, 9 elected by the members, who in turn elect 2 Directors-at-large who give concentrated attention.

Another co-operative organisation visited was the Appalachian Co-operative Electric Company. This has 8,000 members. The money for financing the extension of electric lines has been obtained from the Rural Electric Administration of the United States Department of Agriculture. The Association serves farmers and urban people in the Jefferson County.

The electric rates are as follows:—

First	50 Kw	3 cents each
Next	150 ,,	2 ,, ,,
,,	200 ,,	1 cent ,,
,,	1,000 ,,	0.4 ,, ,,
All over	1,400 ,,	$\frac{3}{4}$,, ,,

The Co-operative pays T.V.A. $\frac{1}{2}$ cent per Kw for its electric energy. The borrowed funds are being repaid out of the earnings. The Co-operative has so far acquired plant and line facilities valued at about 2$\frac{1}{2}$ million dollars and the outstanding debt is about $ 1,400,000.

The Norris Dam, the Atomic Museum, the T.V.A's Steam Plant at Kingston on the Clinet river, which will use 250 cartloads of coal daily, the Co-operative Milk Plant at Chatanooga were visited and extensive use of electricity in rural homes was observed with interest.

Alabama Polytechnic Institute, College of Agriculture, Auburn, Alabama, the organisation, equipment, etc. of the College for Research, particularly village research, peanut cultivation and use of mechanical equipments for lifting peanut, pasture development, fish production in small ponds and the adaptation of visual aids to extension teaching were studied.

The project run by the School of Agriculture on commercial production of fish, such as carp, deserves special mention. The station comprises 1,300 acres with 120-125 acres in water. In 700 additional acres, dams have been built in all available places and about 80 acres of water are impounded. The catchment area is covered by Kudzu vines for soil conservation. Average annual rainfall in the area is 54″, of which there is 20″ run-off and 7″ surface run-off and about 13″ underground run-off. The water is collected in several small and large ponds. Evaporation is about 48″. Springs are made in each pond by 'Transite Pipes' with rubber rings, which are easy to handle, and can be put together quickly, and re-used. Commercial fertilizer mixtures used are 8% N, 8% P_2O_5 and 2% K_2O_5 at the rate of about 800 to 1,200 lbs per acre. N and P_2O_5 are the nutrients used for increased production. The fertilizers are given at

3 or 4 intervals. Cotton cakes and soyabean cakes are also used. Cost of manure is about $ 23 per acre per year. The catchment areas with thick growth of Kudzu vines are used as pasture.

The other item of interest was the 'Visual Aids' used in the Directorate of Extension in the State of Georgia and the demonstration given by a Directorate official of the various 'Audio Visual' methods. The comprehensive talk by the State Director of Extension, Georgia, on different Extension problems and the philosophy of evolving and using suitable methods based on the resources and environment, the fundamental factor always being the 'wise use of land resources', also deserves mention.

Observations in the research laboratories were to the effect, that use of commercial fertilizer in a balanced mixture was of remarkable value for increased production; deep ploughing was unnecessary, in fact, inadvisable; extensive use of chemicals for control of weeds and pests was economical. In the Tillage Laboratory, it was gathered, that 8 lbs pressure on tractor tyre was better than the manufacturers' recommendation of 12 lbs pressure.

The Tuskegee Institute, Alabama, which was visited is the great centre for Negro education founded by Buker T. Washington. The Extension programme was developed from the expressed needs of the Negro people, designed to help Negro farm people to help themselves. The determined efforts of the Negro people to improve their own conditions through the philosophy of 'self-help first' cannot but impress any observer. The college research and Extension programme on low cost housing deserves special mention. The farmers are taught to prepare concrete slabs and to build houses entirely by self-help. Arrangements for supply of additional items, such as doors and windows etc., are made with firms manufacturing these as standardized products at low costs.

Several small farms were visited where Negro farmers of small means struggle to make both ends meet.

At the University of Missouri, the relationship between

The Itinerary.

Extension, teaching, and research, the principle of a research programme based on the needs of the people, obtained through the Extension Service, and the way research findings are made available to the people again through Extension Service were discussed. The balanced farming programme, with particular emphasis on working with the family as a unit, was studied. The principles and relationship of Extension Service with other agencies serving the rural people were reviewed. The balanced farming programme, intended to integrate all the different problems and to formulate a complete and comprehensive development plan for the farm family was of special interest. A lecture by Dr Willm. Aubrecht of the research section of the University deserves special mention. Dr Aubrecht emphasised the problem of protein value through which life flows. Hybrid corn, he said, may give 20 per cent increase in yield but that should not cause undue optimism as it was found on examination that the 20 per cent increase of yield in hybrid corn meant 20 per cent decrease in protein; on the other hand, while bulk production is being attempted soil nutrients decrease through yield. The real problem, according to Dr Aubrecht, was not so much to increase bulk, but secure proper plant nutrition and production of food with high protein value. The other point made by Dr Aubrecht was that it is not always safe to take to nitrogenous manures because they are cheaper and give more yield quickly. In using manures we should always bear in mind the relative positions of other nutrients, such as phosphorus and potash. In respect of the control of weeds, he was firmly of opinion that the idea of clean cultivation by cleaning weeds at high cost was not essential. Anything against nature should be done with caution, he felt. We may clean weeds but we do not know what components from the soil we are taking away or disturbing by doing so; and whether this would not lead ultimately to the utter destruction of our soil construction "Keep the weeds away by all means when plants are young," he said, "but leave them afterwards and let them remain as a cover crop." In support of this view he took the delegation around his own experimental

plots in the farm where, continuously for 63 years, he had been growing wheat under such modified control of weeds and side by side on clean fields. The results proved that the method of modified control of weeds as compared to complete eradication appeared to be better not only from the point of expenditure or cultivation but also regarding the maintenance of soil fertility; at the same time, it gives an all round better yield. In his experimental plots, it was also noticed that the use of fertilizers was always essential and better than no fertilizers. While 63 years average in the plot with no fertilizer gave 9.1 busls yield per acre—the 63 years average with a fertilizer programme composed of nitrogen, phosphorus and potash in clean plots gave a yield of 20.4 busls per acre and 19.9 busls per acre in the plot where modified control of weeds was practised. More nitrogen was held by the plot with modified control of weeds which improved the organic matter in the soil. Dr Aubrecht's trial plots were also interesting as they were of small sizes. He asserted that experimental trials, if conducted properly and rationally, can be successfully carried on with remarkable results in very small plots and no large area was required for the purpose. He suggested that experimental trials should be so conducted that the research worker may be able to attend to the plants and the plots himself in all aspects; that such experimental trials should be carried on only where the research worker can directly devote his time, as the data collected through an agency other than the research worker himself was liable to error.

While at the Missouri University the delegation studied the organisation and activity of the Production and Marketing Agency of the United States Department of Agriculture. Details of the activities of this agency will be given later. This is an action agency of the United States Department of Agriculture as against the advisory agency—the Extension Service. The main task of the P.M.A. is to tackle the problem of production, to help stabilisation of markets and to render direct services for soil conservation and community trade. The outstanding service rendered by

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the P.M.A., apart from the soil conservation work, is in respect of price fixation. Price is guaranteed for any priceable commodity on the basis of the previous price report. The other important activity is the implementation of the crop insurance scheme.

While in this State, a week was spent in a county office and the office organisation, the routine duties of the County Agent, Asstt. County Agent, the Home Demonstration Agent and the Office Secretary were observed. Different farms in the county and several county homes were also visited in company of the County Agent. The simplicity of office routine work and the simple method by which soil testing was carried out by a purely non-technical paid employee in the office of the County Agent were points of special interest. A regional conference attended by representatives from the office of the State Directorate of Extension and all County Agents of the State was also attended and the method of planning by discussion was observed. The 'Balanced Farming Plan', which is a special feature of the State Directorate of Extension, was also studied. The 'Balanced Farming Plan' is a good farming arrangement. The system keeps in view the interests of the farm as a whole, and all the factors, including the future of the land, are taken into consideration. Farming being a family enterprise and the improvement of the home being linked with each family, the problems of home improvement are also considered, and the plan aims at eventual profit without detriment to resources.

Several farms were visited in the State. Average holding is about 160 acres while most of the farms are between 200 to 300 acres. Livestock farming on improved pasture lands is practised by a large number of farmers, while some take to crop husbandry through systematic rotation. Average of crop yields compared to that of other states is low and use of lime and phosphate is widely recommended. Eighty per cent of the farms have electricity.

The activities of the High Yield Clubs were of special interest and the delegation observed the activities of a '100 Bushels Club'.

The visit to the Pueblo Indian villages, Nevaho Indian villages and Spanish American villages in the State and study of methods and techniques used for gaining confidence of people with different outlooks and cultures and to meet the needs of small farmers was inspiring. The methods of getting people to express their felt needs, the importance of accepting the principle that the people preferred, traditional ways of doing things, and that any particular method cannot be prescribed for all, the importance of group discussions in both formal and informal gatherings and basic Extension methods to bring about changes in farmers' homes and villages were discussed. A part of the delegation spent two days on very small farms in a Spanish American village and observed the Extension methods used in that backward village for gradual conversion of the farmers to better processes and for building up local organisations for the improvement of the community.

At the University of Arizona: The irrigated vegetables, citrus and cotton areas in Maricopa and Pinal counties, the different types of irrigation applied to small farms, the water conservation programme, the rehabilitation plan and the Extension methods and techniques used among farmers of mixed cultures were the main features studied. During this period, opportunity was taken to visit the Grand Canyon and the vast desert areas of the country.

The work of the Imperial County Extension Service, El-Centro, Riverside Experiment Station, and the work of the Los Angles County Extension Service were seen at California. The cultivation of sub-tropical fruits and winter vegetables through irrigation, the effect of temperature, shade and sprinkling on the weight gains and milking of cattle, the production of citrus fruits and sub-tropical fruits and the methods of handling and marketing were studied in the State. The experiment station for reclamation of saline area was also visited. Opportunity was also taken during the period for a visit to the Hollywood Studios where techniques and methods of film production were seen at Fox Film Corporation Studio.

THE UNITED STATES AND ITS AGRICULTURE

The United States has a land area of about 1,900,000,000 acres, with diverse climates varying from sub-tropical in the extreme south-west to long winters and brief summers in the north. The coastal plain is wide in the south, narrow in the north. The Appalachian in the east, the Ozarks and Ouchitas, in the south-east centre, the famous Rocky ranges running from north to south in the south-west centre, the Sierra Nevada ranges on the Pacific coast, are the many mountains that cause the needed rain and sustain the bulk of the crops with an annual rainfall varying from 0″ to 120″. Through the heart of the central low lands flows the 1,600 miles long Mississippi with its tributaries, the Missouri, the Arkansas, the Ohio, the famous Tennessee and the Red River, together with the Columbia, the Colorodo and other minor streams. These enrich the valleys, on which great cities have grown to meet the needs of farming and allied industries and other manufacturing enterprises. The United States stretches along roughly 2,500 miles from the Atlantic to the Pacific and about 1,000 miles from north to south. This vast area is linked from one end to the other, through cities and villages, by a network of hard surface roads, railroads, electric and telephone lines.

Topographically, the country can perhaps be broadly divided into three main regions :

(*i*) The Western Region with the great Salt Lake Basins between the Sierra Nevada and the Rockies. The region is as low as 500 feet below sea-level, a dry thirsty area with a rainfall of less than 5″ in the year. Here lies the grim and the dreary desert lands of the United States and the eroded soils with stunted bushes, where the American Indians struggle for living still holding tenaciously on to their

age-old traditions and practices. This area was once an inland sea and has still many salt lakes including the Great Salt Lake and the world's great wonder 'the Grand Canyon' with its fathomless bottom. While the Pueblo and the Nevaho tribes still struggle with their limited knowledge and resources, the Mormons have transformed their desert lands in the Salt Lake City area into productive farms. In this dreary and depressing environment are situated rich gold and silver mines. The rich irrigated valleys of the California State, with their green fields and multiple crops, inspiring orchards and the illuminated sky-high towers of rich petroleum mines also lie in this zone.

(*ii*) The Great Central Plains between the eastern and the western mountains extend from the Gulf of Mexico on the south, and include the Great Plains, known as the Prairies, which stretch over 1,400 miles from Mexico to the Great Lakes, measuring over half a million square miles, with wide, open, treeless expanses of land, once a vast grazing ground, through which the followers of the 'Pilgrim Fathers' trekked with their large horse wagons. These lands are now vast wheat fields, large cotton farms, or flourishing with excellent crops of tobacco, and many industries.

(*iii*) The High Plains in the east of the Rocky mountains, comparatively less fertile and with inadequate rain, known as the 'Bad lands' is another region.

The soil types, as classified by the United States Department of Agriculture, are Podzols, grey-brown Podzols, Red and Yellow soils, Pacific Valley soils, Northern Chernozem, Northern dark-brown, Prairie, Southern Chernozem, Southern dark-brown, Seirozem and desert, Northern brown, and Southern brown. The best naturally watered farming soils are the Prairie soils of the middle west and the grey-brown Podzolic soils to the east of the Prairies. The Red and Yellow soils of the south-east are stated to have low organic content and are subject to heavy leaching from rains but are good farming lands under proper management. Other good farming lands are in the Northern and Southern Chernozem zone and the dark-brown soils in the north

within the great plains east of the Rocky mountains. With irrigation, Pacific Valley soils are also good for farming while the rest are considered unfavourable for any profitable farming.

Agriculturally, the country can be divided into the following main regions :

(*i*) *The Cotton Belt:* This belt covers about 690 counties in the southern zone where the growing season is long and rainfall is moderate, the excessive rainfall having been found to be a hindrance in the control of pests and diseases that infest the open boll during harvesting. This belt has also other crops, such as tobacco, peanuts, wheat, truck crops, pasture and livestock, including range livestock. This zone has 23% of all the farm counties and 31% of all the farm people. Its range of farm tenancy is the highest but its average value of farm products per farm is relatively low. In the small and medium farms most of the work is done by the farmer and his family, while, in the plantations, hired farm labour and share-croppers are employed. Farm work in the cotton area is highly seasonal and other part time occupations in the nearby industries are found by the farm people. This belt is the most rural part of the United States, has a comparatively low standard of living and a high birth rate. Cotton farming in the country has been characterized by great fluctuations in yields and prices. The prosperity of the zone, therefore, varies with the price and yield of cotton. A few good harvests in succession mean prosperity and better living, while a series of bad years results in adversity and mortgages. In the fertile Mississippi delta, however, where the land is mostly level for miles and miles, and the farming units are large, one notices extensive use of mechanical equipment, including the new mechanical cotton picker, which reduces the cost of production and assures a higher standard of living. This is the zone where the Negro labour still struggles for a living.

(*ii*) *Corn-Livestock Belt:* The Upper Mississippi, with its level lands, dependable rainfall, hot summers and rich prairie soils, is ideal for corn and has many family-sized corn-live-

stock commercial farms. Corn and livestock are farmed together since most of the corn is fed to farm animals grown for meat. Other crops, such as oats, winter wheat, clover and other legumes, etc., are also grown on these farms. In a rotation to replenish the soil and to utilise the farm labour rationally throughout the year, oats are sown in the spring before corn is planted and are cut in the summer after cultivation of corn is completed. Soyabeans are planted after corn. Winter wheat is seeded shortly before the corn is harvested. All these crops are either sold or fed to livestock. Clover and legumes are used for pasture and hay.

Corn-livestock farms are family operated commercial enterprises. The area of these farms varies between 160 and 200 acres. Fourteen per cent of the total farm population lives and works in such farms. Some of the farm workers have full time jobs throughout the year and a few work off their farms.

The standard of living in this zone is fairly high and the birth rate relatively low. Corn-livestock farms are both well-off and well organized with sound farmers' organisations, including co-operative societies of various types. The corn-livestock farming zone is one of the melting pots of various cultural traditions and languages where the one nation of the United States (i.e. the American) has grown displaying a high sense of community living.

(*iii*) *The Wheat Belt:* While wheat is grown in most parts of the United States, excepting only those places where rainfall is excessive or below 6″ per year, the western plains with plenty of moisture are, however, the major wheat region. The region comprises the central and northern Great Plains and the Columbia Basin of the north-west.

Crop rotation in this belt is limited and is mostly summer fallow. In some parts barley, sorghum and oats are grown. Peas are grown in the north-west areas. Legumes are hardly grown due to the limited rainfall and periodic droughts.

One is impressed by the use of big machineries, which are used from planting to harvesting in the wheat-belt. The farms are large and the region is sparsely populated.

Except during the busy time of seeding and harvesting, the farm families in the wheat country have considerable leisure. These farms have produced many educated middle class farmers with a better standard of living. Uncertain rainfall, hail-storm and rust are the main factors that occasionally mar the pleasure of wheat farming. Thanks to the staff of the United States Department of Agriculture and Land Grant Colleges, however, the farmers of today have learnt how to preserve the limited moisture in the soil by summer fallowing and stubbling mulch and guard against erosion by strip cropping. The farmers follow a definite time schedule in planting and harvesting. A few days too early or too late may mean the loss of soil moisture and destruction of the ripe corn by wind or hail. The wheat planting days are announced by the United States Department of Agriculture to help the farmers to maintain precision in planting.

The wheat farmers are the educated farmers of the United States who use the biggest farm machines in the country. They have their share of adversity and prosperity but depend more on themselves than on their leaders. They practise mutual aid, co-operative marketing and insurance of their crops. "If you cannot take failure along with success," says the wheat farmer, "you had better get out of this part of the country."

(*iv*) *The Wild-West Ranch-Livestock Region:* The ranch lands are in a band, 500 to 1,000 miles wide, stretching from Mexico to Canada. They comprise over 30% of the land area of the United States and maintain over 14% of cattle, 45% of the sheep but have only about 3% of the nation's total population. These are the best areas in the western part of the country that is too high and dry, with rough, rugged and varied landscape and meagre rainfall. In the west country, sturdy ranch farmers, derived from the stock of the Spanish and other European races, canter and trot along the wide open spaces on their thorough-bred stallions. The rancher knows how to raise a good breed of livestock, how to ensure adequate supply of grass and water for his livestock and to make his business profitable. In ranch

farming, sharp intellect, courage, physical strength and patience are essential. It may be years before the results are obtained and managerial ability is of vital importance. Men, women, boys and girls all take active parts and know how to control their turbulent horses and ride out to examine the fences, attend calves or the sick animals. This is the glamour land of the wealthy industrialists and the city dwellers who spend their leisure in the comfortable ranch homes with the ranch families. The ranch farmers are known for spending freely for the comforts of the home, for good automobiles, and education. The ranchers love their cow-boy hats, cow-boy boots, their weapons, the horses, and use their cattle brands as decorations in hotels and restaurants. In spite of their rugged exterior, they are amiable and social and take personal interest in one another, although they live miles apart. Most of the ranch lands are owned by the Government. The ranchers are sold grazing rights from these public lands. In spite of hard work in the management of the ranch, there is considerable leisure in this type of farming. Cattle are reared in wide open spaces and brought to the ranch headquarters or at some central point in the ranch once a year to be dipped in vats with chemicals to remove insect pests. At this time the calves are castrated and branded for the particular ranch. Sheep grazers have busy time when lambs are born and during shearing. In some ranches, sheep are moved in the summer to higher altitudes and brought back to the valley in winter. Ranchers are usually without barns or shelters, although some shelters are kept for protection during severe blizzards. Forage crops for winter feeding are not normally grown. Some ranchers grow a little wheat and corn.

(*v*) *Irrigation Belt:* This belt is scattered over the 5 States in the west and comprises 8 million irrigated acres, which are supplied with water by rivers, reservoirs, canals and deep tube-wells that go down as deep as 25,000 feet. The initial cost of irrigation being heavy, high price commodities are normally produced in this belt, such as apricots, cantaloup, avocado, carrots, cherries, figs, lemons, lettuce,

oranges, potatoes, etc. In this area, good alfalfa seeds, clover, vegetable and flower seeds are also widely produced. These scattered irrigated areas are now expanding rapidly with more and more irrigation. Many of these irrigation projects were financed by public money. The size of holding in the Federal provided water was at first limited to 160 acres which has been reduced to 80 acres. This limitation was enforced to safeguard and increase consolidated large farming. Moreover, families that operate the farms themselves were given preference in settlement in these irrigated lands. These are actually the Government reclaimed areas. The Good Year Tyre Company has a number of such projects operated and financed by them, where their tyres are also tried. Two of such settlements were visited where the settlers were growing good crops.

The farmers either own or hire the farm machinery they need. Much of the agriculture in this area is highly specialized and may be classified as commercial farming. Production of food for the family is not usually done in this belt. This is another zone where originally Germans, Italians, Portuguese, Irish, Scandinavians, Russians, Hindus, Chinese, Japanese, Filipinos, Mexicans and South Americans had settled and ultimately grown into American nationals. Migrant families and seasonal labour work on these farms during the busy season. State-owned Farm-Labour Camps are used by them. This is becoming a problem and is being studied by a Presidential Commission.

These small producers are organised into associations. Their agricultural products are sold even before they are produced and are marketed through giant co-operative deals. The producers have organised associations for shipping their products in and out of the country. These organizations also deal with the impounding and distribution of irrigation water and securing reclamation grants for each colony. This is an area where, in spite of comparatively small holdings, the settlers appeared to be well-off and considerably interested in the development of their areas in an admirably co-operative spirit.

(*vi*) *The Dairy Regions:* The dairy areas are clustered around the great cities and there is at least a small dairy area around almost every city. Commercial dairying, however, is carried on in the populous north Atlantic States, extending westward, beyond the Great Lakes and along the north Pacific coast. The region is comprised of mainly 260 counties and includes the 4 largest cities of the country. In this region, over seven-tenth of the people live in cities, two-tenth in the rural areas in the suburbs, and only one-tenth in farm households.

This is the only major type of farming practised in the eastern part of the country. Dairying is an important agricultural enterprise in the United States and dairy products are extensively used by the people benefiting their general health, vigour and standard of living. Refrigerated pure milk in paper containers is available everywhere, at all hours, and is widely consumed.

The dairy region has ample rainfall favourable for grass farming through the short summer. The well-built barns for storage of feed are typical of the region. Large quantities of feed concentrates, popularised by commercial firms, are used in the dairies and supplementary enterprises such as cultivation of small grains, potatoes, cabbage, fruits, truck crops and poultry are undertaken.

The dairy farmer and his family have to work hard practically every day of the year keeping long hours. Cows must be fed and milked at definite times every day; fluid milk must be cooled, put into cans and loaded in the milk trucks and milk trains; cream must be separated, cooled and shipped to the butter factories; milk pails, cans, cream separators and milking machines must be cleaned and polished carefully. Many of these duties are done by women, while men have, in addition, to attend to breeding of stock, raising of calves, handling and spreading of manures, care of buildings and equipments, buying supplies, attending farmers' meetings and livestock sales, and supplementary enterprises. The white painted barns, houses and the fences, the clean utensils and equipments, the green fields, the well-

built silos and, above all, the production records of the cows, are matters of pride to the American dairymen. There are a few giant dairy farms but the bulk of the milk is produced on family farms by the farmer and his family. Hired helpers are rare as dependability, faithful attention to details, and considerate handling of cows, which are essential, require personal attention. The machines have, therefore, stepped in to save the farmer and his family from the monotony of many items of work.

The success of the dairy enterprises in the United States is mainly due to the production of the bulk of the feed in the farm itself and to the reduction of the cost of production by the use of machines and labour saving devices.

(*vii*) There are also many small self-sufficient farms, mostly in the mountain regions and on highways to holiday resorts. Most farm products are grown primarily for the family. One notices saw-mills, flour mills, etc. still powered by water; milk and butter still kept and cooled in spring houses; meat cured in smoke houses; vegetables stored in cellars. One and two horse ploughs and horse-drawn wagons are common sights while tractors are rare. The farm women utilize their extra time producing beautiful handicraft work.

Crops, such as tobacco, sugarcane, fruits and potatoes, are grown partially in scattered localities in all the main regions mentioned above but mostly in the eastern half of the country. Sugarcane is grown commercially in Louisiana and Central Florida. Sugarbeets are prevalent on irrigated farms in the far west in the mountain areas, in Southern Michigan and Northern Ohio. Apples and other fruits are grown in the irrigated west, around the Great Lakes, the Pacific north-west and in the upland areas of Carolina, Georgia and Arkansas. Potatoes are grown throughout the country but mainly in the Red River Valley in California; oranges and grape fruits are grown in Florida and the irrigated areas of the west, and are mostly used for juice, to be canned or frozen, which is widely consumed in the country. The pulp is ground and dried for dairy feed.

To sum up: the United States has a land area of about

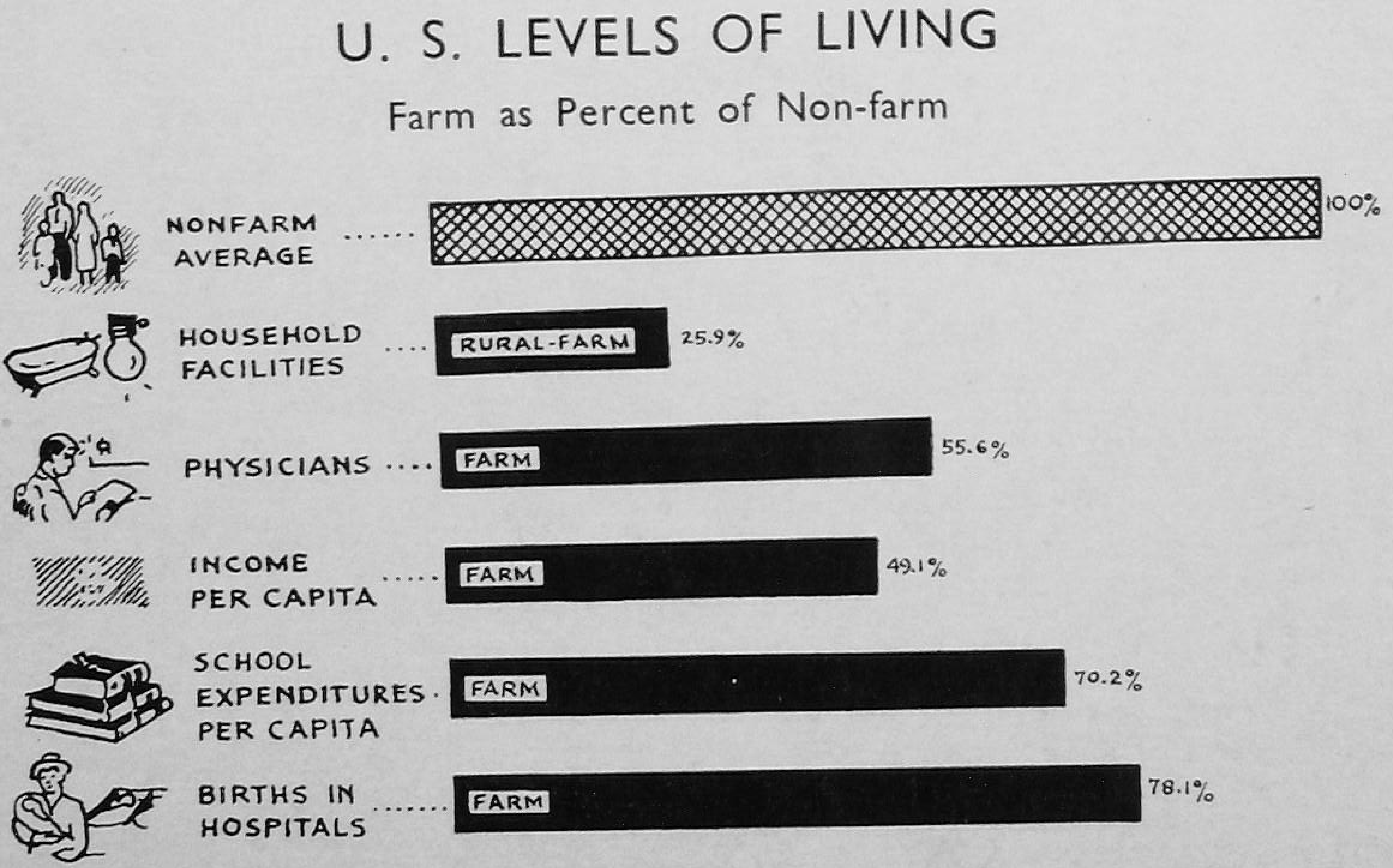
3 million sq. miles or 1,900,000,000 acres. Roughly 1,142,000,000 acres or 59·9% of it is taken up by farms. Half of this area is under crops and pastures and the rest under natural pastures and weedlands. The remaining 40% (i.e. 7,63,000,000 acres) is made up of forests, grazing lands, deserts, waste lands, cities, parks, roads, etc. The irrigated area is about 22 million acres. About 135 million acres have improved drainage. Of the 5·8 million farms about three-fifths are in the older humid region in the east of the Mississippi river, one-twelfth of the farms are in the west and the remainder in the middle between the Mississippi river and the Rocky mountains.

The size of farms varies from 3 acres or more to 100,000 acres. In 1945 there were 98,966 farms of less than 3 acres and 262 farms of more than 100,000 acres. The average size is about 195 acres. With the increased use of machines the size of holdings is increasing rapidly. Large farms are mostly in the higher and dry western zone of the country; the small farms are mostly in the south and east, in the irrigated areas of the west, and in the vicinity of large cities. The majority of farmers own their lands although there are also many share-croppers.

The gross income of the farms varies from $ 250 a year to more than $ 100,000. In the smaller farms the income has often to be supplemented by work off the farm by the farmer and his family. The largest incomes are mostly from commercial farms that produce fruits, nuts, livestock, vegetables, wheat and cotton.

The farm tenancy systems are : cash tenants, who pay an annual cash rent; share-crop tenants, who pay part of the rent in cash and the rest in produce; share-tenants, who pay a share of either the livestock or the produce or both; and the share-croppers to whom the land-lords furnish animals or tractors and other equipments.

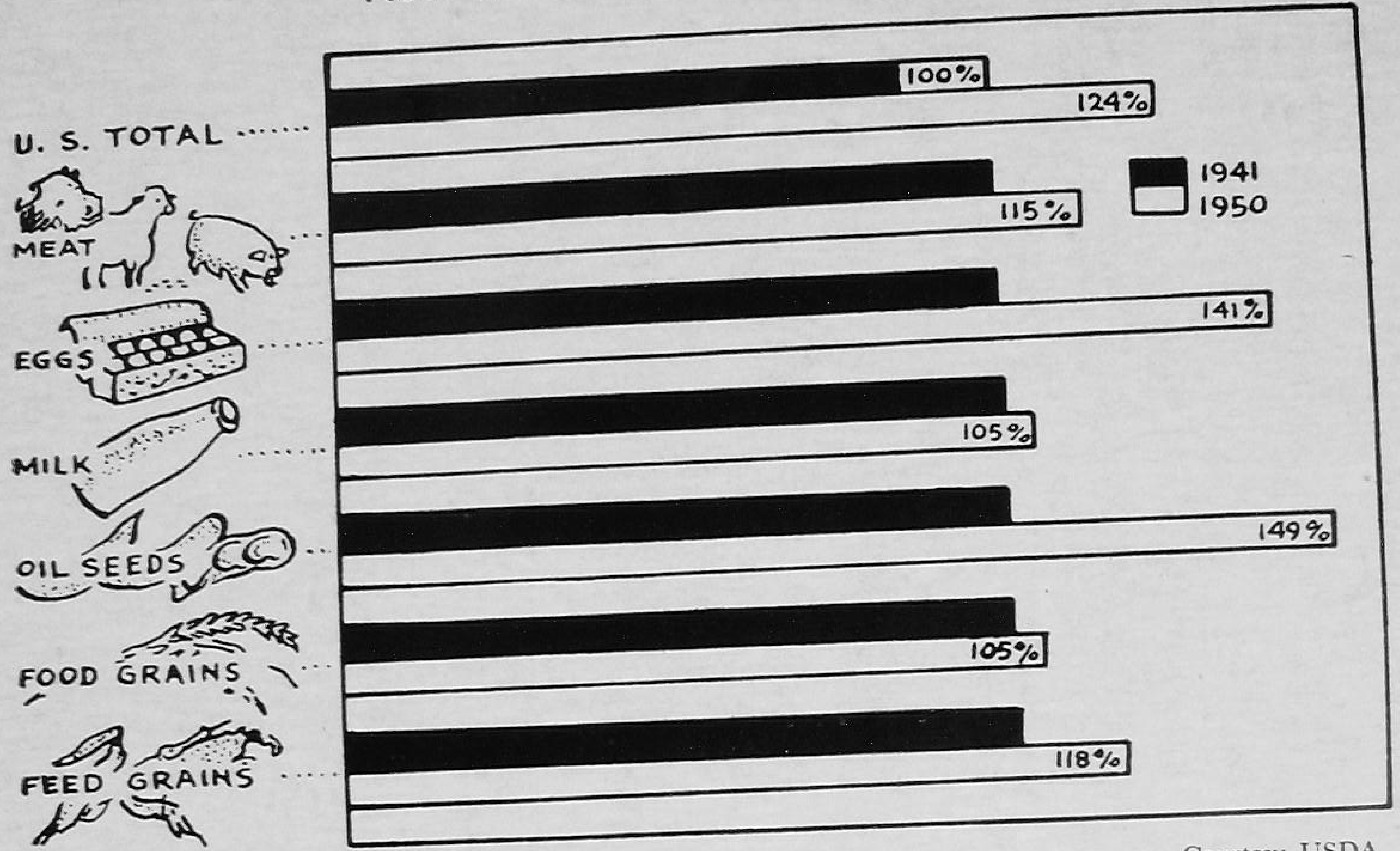
With the increased use of machinery and the difficulty of labour there is a marked tendency towards specialized farming. Machineries are available on hire on easy terms under the purchase system. Seeds and fertilizers, disease



Courtesy USDA

FARM PRODUCTION

Now and before World War II



Courtesy USDA

control measures, and such other services are rendered by traders most efficiently and concentrated fertilizers as well as cattle feed are extensively used.

In the broadly divided regions there is, however, a unity, in the sense, that many different types of farming are practised in one and the same region. Although industrially a great nation, the people of the United States and their leaders give agriculture and the rural areas the greatest attention and priority. Short term and long term credit is assured; proper services by trades under the control and guidance of Government are made available; the price is assured; facilities for obtaining tractors and other machineries at the most easy terms are arranged; irrigation facilities are made available; a network of hard-surface roads has been built and all market and trade centres have been linked; electric lines for power and telephones have been installed; refrigerated trains and trucks carry perishable products at low cost, depending for their profit on the large volumes handled ; the services of the scientists of the United States Department of Agriculture and Colleges have been made available; willing co-operation and guidance of the United States Extension Services are assured, and an excellent 'out-of-school' education for the entire nation is made possible.

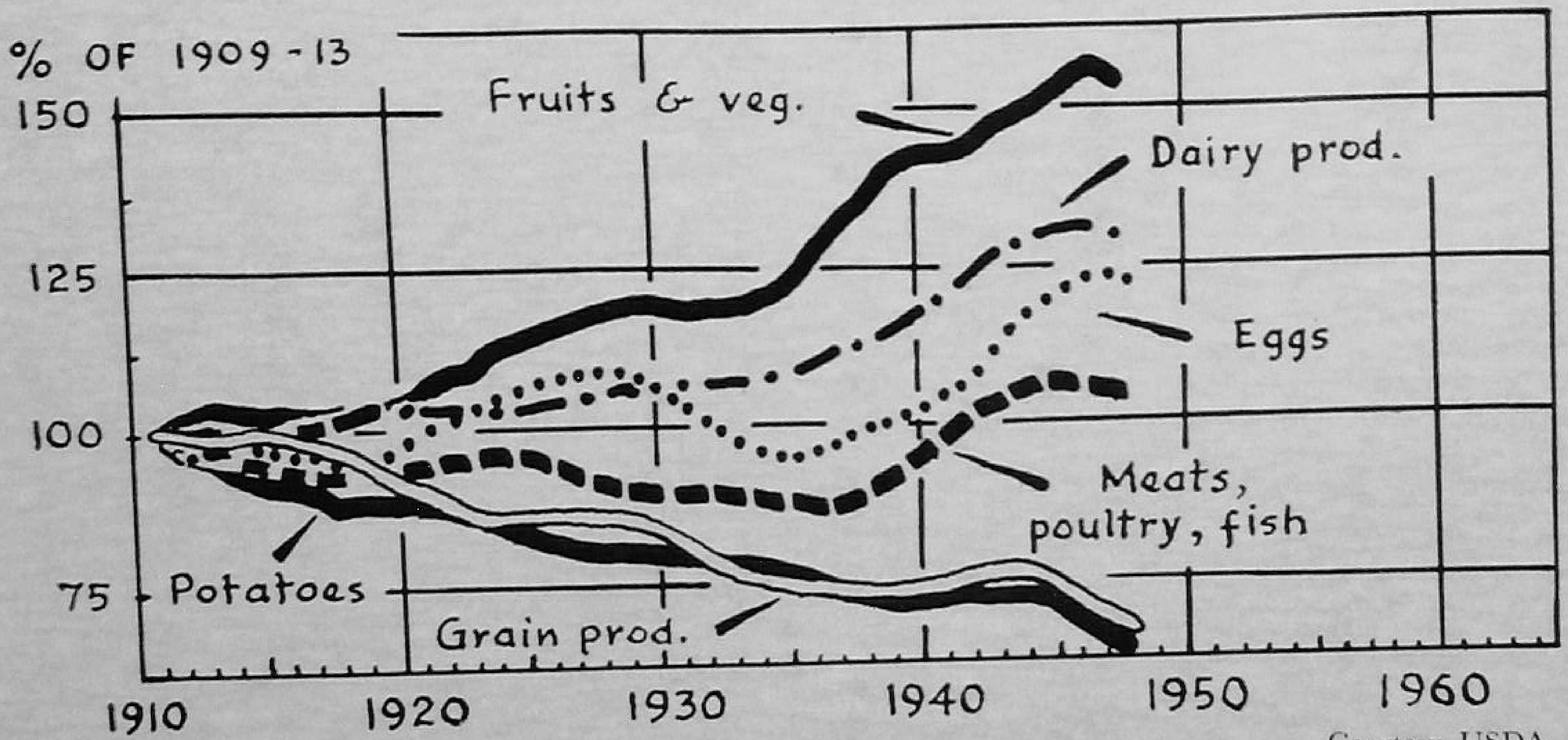
These are the main activities which considerably raised the level of production and assured success in the farming profession. From 1½ million in 1850, the total number of farms has gone up to over 6 million today; from only one million tractors in 1930 the number went up to 4 million tractors owned by private farms in 1950; and from about 37 billion eggs in 1930 the number rose to 60 billion eggs in 1950. There has been an increase of about 20% in milk production in 25 years; the yield of corn has gone over 40 bushels per acre when the average in 1930 was only 20 bushels. The 'Hundred Bushel Corn Clubs' today are striving hard to win as many 100-bushels-per-acre prizes as possible. Similarly, the yields of wheat, rice, potatoes, cotton and tobacco have gone up; and farm production per worker now is more than twice as much as it was 40 years ago.

There has been little increase in the cultivated area during the last 40 years. In fact, since the depression of 1935, the number of farms has gone down from about 6¾ million farms in 1935 to less than 6 million farms in 1945. The increase in total production stated above is largely due to higher yields. Egg production has increased because the hens have been producing more eggs per year; milk production has gone up because the cows now produce more milk. Better breeding on a wide scale and scientific feeding have contributed to this steady increase.

The increased production and output is due to the increased use of science and modern inventions, the most important of which are the tractors and other labour saving farm devices. While the use of science has contributed to better yields, the use of machines has made better and economical farming possible and has encouraged large-scale farming. And, consequently, in spite of hardly any increase in the area, the total production is large enough not only to meet the full requirements of the nation, which now consumes more food per capita than before, but, also for substantial exports. In 1950, the farmers in the United States grew 3·1 billion bushels of corn, 1·0 billion bushels of wheat, 9·9 billion bales of cotton, 5·5 billion dozens of eggs, 22·5 billion pounds of meat, 28 billion pounds of fresh vegetables, and 121 billion pounds of milk. There were 80 million cattle with about 20 million milch cows, 60 million hogs, 31 million sheep and 481 million chickens. For each of the 150 million people of the country the 6 million farms, covering about 1 billion acres, produced an average of 31 bushels of corn, 7 bushels of wheat, 33 pounds of meat, plenty of fruits and vegetables and 807 pounds of milk. Compared with the position before World War II, each individual now gets 30 lbs more meat per year, 7½ lbs more eggs, 37½ lbs more dairy products, 22½ lbs more fruits and vegetables, more fats and oils and some quantity of beans, peas and nuts, in spite of the fact, that the population is steadily increasing and has practically doubled during the last half century.

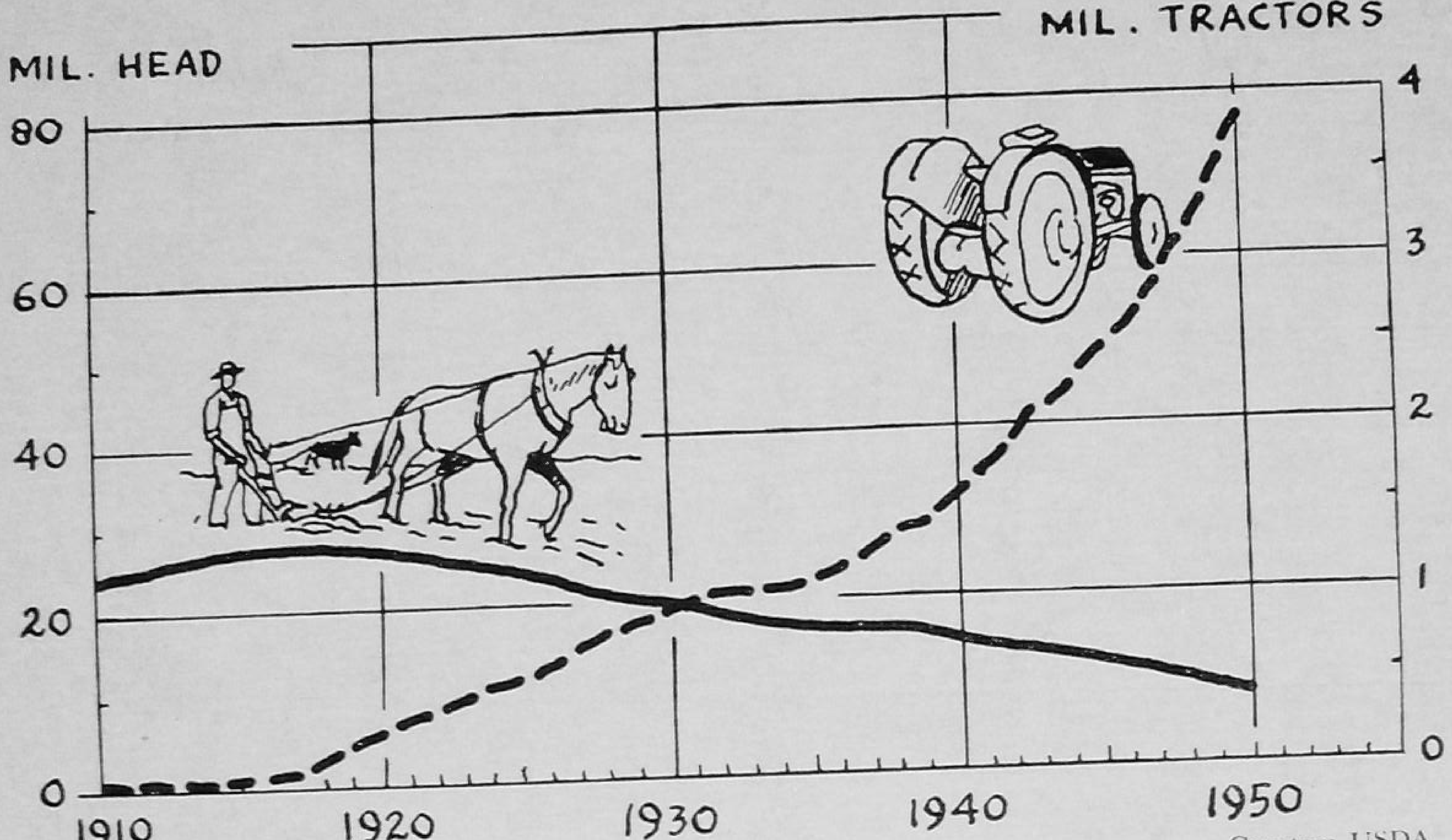
The change in the eating habits proves the increase in the

TRENDS IN EATING HABITS IN U. S. A.



Courtesy USDA

HORSES, MULES AND TRACTORS
ON FARMS, JAN. 1



Courtesy USDA

standard of living. Consumption of fruits and vegetables has increased by 50%; of dairy products by 130%; eggs by 25%; meat by 20%; while that of grains and potatoes has decreased.

In this achievement the United States farmer has a high place. The United States farmer, like the farmer everywhere, is influenced by his environment. But, in general, he is industrious and resourceful in improving his situation. He is always anxious to find new solutions to his problems. Mechanical and social inventions have followed as an answer to the desire of farmers for self reliance and independence, and their eagerness to adopt a fresh approach. These are the men accustomed to change, prepared to adopt new ways for betterment; these are the sturdy backbones of the nation who appreciate self-help. Their philosophy is that they must work together to establish their cherished local governments and community organisations. Through farmers' organisations they express their views in local and national politics; through co-operative societies they buy and sell advantageously; through the use of machinery and science, through their tenacity, zeal, and enterprising spirit, through the excellent credit system under the guidance of the State and sales organisations, through their own societies, and through self-help and community organisations, they have increased their production to their present high level.

MACHINES THAT SAVE LABOUR AND DOLLARS

The United States is a land of machines and gadgets. More than one-half of all farms now have tractors, more than four-fifths have automobiles, and nearly one-third have motor-trucks. In addition, most of these farms have manure spreaders, grain combines, corn pickers, mowers, side delivery racks, milking machines, frigidaires and deep freezers, etc. Many farms hire tractors from their neighbours. With hardly any tractors in 1910 about 4 million tractors to-day plough,

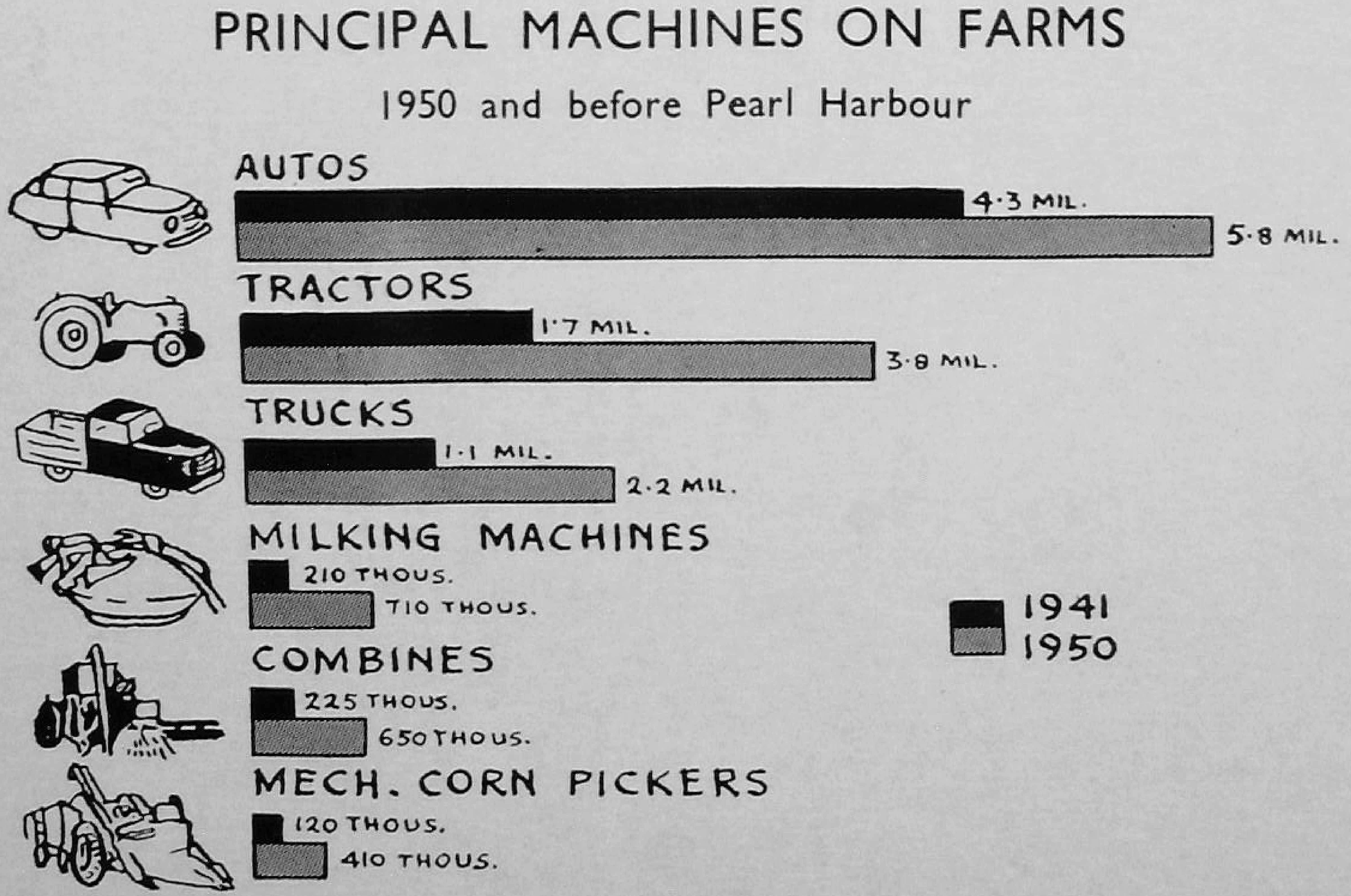
harrow, and harvest farm lands or haul farm produces in about 3 million farms. Over 80% tractors plough, disc, and harvest; over 75% harrow and drill seed; over 40% plant corn, cotton and potatoes, and over 60% harvest crops.

The small 'Ford' or 'Fergusson' tractor, driven by a young farmer, is a common sight on a farm. Wide use of these two types has simplified the problem of maintenance and, although, the manufacturers have set up excellent organisations for service and maintenance, the farmers also know the proper use and maintenance of their machines. The other types of tractors noticed were the 'John Dere', 'International' and 'McCormic Deering'.

The farm homes also have many labour saving gadgets and conveniences. Over 86% of all farm dwellings now have radios, many have electric washing machines, electric refrigerators, electric vacuum cleaners, and electric water systems. Others have gas and kerosene refrigerators, and washing machines run by motors on petrol or powerine. The drudgery of the kitchen has been minimized by the use of electricity, gas and kerosene and cooking ranges neatly arranged under the directions of Extension Home Agents. These machines have not only improved the standard of living but have also reduced the household cost on daily life and the drudgery of daily domestic duties. Machines plough lands, harvest crops, handle produce, cook foods, wash clothes, serve drinks, postage stamps, cigarettes and chocolates. The daily burden of life has been minimized so much by machines that men and women can now save the dollars that they once spent on services and can use the time saved towards the better occupations of life.

THE TENNESSEE VALLEY AUTHORITY

The Tennessee Valley Authority is the farmers' body that tamed the turbulent Tennessee river for service of the people and fulfilled the dream of the great dreamer, Senator Norris.



Courtesy USDA

A county agent (left) collects a soil sample from a farmer's field for analysis in his extension office and laboratory

Originating from the Appalachian mountain the Great Tennessee river flows in three directions; first, to the south, then, to the west and finally, back towards the north. "She flows up the map," they say in the Valley. The river traverses through seven historic States—North Carolina, Virginia, Georgia, Alabama, Mississippi, Kentucky and Tennessee. Her five tributaries—the French Board, the Holston, the Hiwassee, the Little Tennessee and the Clinch—supplement her strength from the heaviest rainfall in the eastern zone of the United States. The destructive river raging down the valley brought for years irreparable damages and destructions to men and women of the valley, their properties, their animals, and the green forests that added to the beauty of her shores.

To-day, thanks to the vision and the dream of the late Senator George Norris of Nebraska and the planning and labour of the builders, the mighty river has been harnessed for the service of men and women of the valley and the nation. The barren and eroded lands of the valley have now become fertile farms; the destructive energy of the river has been transformed into tremendous electric energy serving not only large modern industries but also small farm homes. In the Tennessee Valley, farmers milk their cows by electricity, women work in modern electrically equipped kitchens; trade and commerce flourish from the increased all round production and shipments through the man-made waterways, which also serve as fisheries and playgrounds.

The Tennessee Valley Authority was created as a regional federal corporation in 1933 with a three-man Board of Directors, responsible to the President and to the Congress of the United States. The preamble of the Act had four major objectives:

> "To improve the navigability and to provide for flood control of the Tennessee river; to provide for re-forestation and the proper use of marginal lands in the Tennessee Valley; to provide for the agricultural and industrial development of the said valley; to provide for the national defence."

Twenty-eight major dams consisting of nine on the main stream, 14 on the tributaries and 5 owned by the Aluminium Company of America control the project. These dams and the auxiliary steam plants produce about 16 billion kilowatt-hours of power a year. In January, when the major flood period begins, over 11 million acre-feet of storage water is available each year. The traffic moved over the waterways is over 470 million ton-miles and recreational improvements on and around the lakes are valued at more than $ 15,700,000. There are chemical plants to produce munitions, a national laboratory and a pilot plant to develop new and improved fertilizers, of which the manufacture of phosphatic fertilizer deserves special mention. Development of land resources and protection of watershed in the 26-million acre drainage basin is another feature of T.V.A's activities. Several new fertilizers have been developed and tested on over 65,000 test demonstration farms. The acreage of soil conserving crops has increased and contour tillage is adopted as a standard practice on over a million acres. New mineral resources have been located and tested, and are being commercially exploited. Fisheries and water fowl resources have been developed and the reforestation of 14 million acres of land under the watershed protection programme brings more than $200 million every year.

The T.V.A's primary purpose is to improve navigation and effect flood control. Each dam in the main Tennessee river has been built at the proper height to form a reservoir which maintains the navigation channel 11 feet deep up to the next dam up the river. The dams are equipped with locks to raise or lower boats moving up or down the river. The dams on the tributaries do not contain such locks. They are primarily storage dams to hold water and to check floods and also to supply water from the reservoir when required. The reservoirs on the dams are raised or lowered on the following schedule for flood control and other subsidiary objects :

(*a*) During December, January, February and March, when major floods occur, water in the reservoirs is kept at the level.

(*b*) After that they are filled up gradually and the highest point is reached in early July.

(*c*) During the last half of the year water is released gradually to supplement the natural flow of stream.

The average annual benefits of the T.V.A. flood control in the Tennessee, lower Ohio, and lower Mississippi basins are estimated, conservatively, at more than $11,000,000 of which the Tennessee basin receives almost half the benefit. In addition, the project has enhanced the land values, increased the free-board on levees, reduced levee maintenance costs, and has saved the region from direct loss of life and property, disruption of communications etc. every year.

In addition to flood control, the T.V.A. has improved the waterways and river traffic which is mounting sharply. The river carried more than 589 million ton-miles of traffic in 1950 and savings to shippers in transportation cost were estimated at more than $7,000,000. Over 120,000 tons of iron and steel products, 43,000 tons of new automobiles, 754,000 tons of petroleum products, huge quantities of chemicals and chemical products, grains, and other commodities were moved in 1950 through these waterways.

Planned control on the level of reservoirs is practised also to kill mosquito larvae and to eradicate malaria. Examination of 6,035 blood films in 1950 revealed no positive case of malaria in the valley against 30% incidence in 1933. The basic methods used for malaria control are water-level management, by the planned fluctuation of water in the reservoirs to kill mosquito larvae by stranding them or by flushing them into deeper water. Application of D.D.T. is also carried out by helicopters on an experimental basis. Studies are being made now as to whether the mosquitoes have developed resistance to the usual dose of D.D.T. and, meanwhile, double dosage of D.D.T. from planes, as a mist spray, is being applied to kill the mosquitoes effectively.

All but the two dams on the Tennessee river and its tributaries are equipped with turbines and generators for producing electricity. The T.V.A's integrated power system

generates 18 million kilowatt-hours of electricity. Of this 86% is produced at the hydro-electric plants. T.V.A. is a wholesale producer and locally owned and managed organisations deal with the retail sale. In 1951, over 95 municipalities and 50 rural co-operatives sold more than 8 billion kilowatt-hours to 1,170,000 domestic consumers, farm businesses, and to industrial consumers in an area over 80,000 sq. miles covering seven states. Residential use of electricity has increased rapidly due to low rates, which are lower than in any other part of the country outside the T.V.A. zone, being only about 1·38 cents per kilowatt-hour. Rural electrification projects are rapidly expanding with the support of the Rural Electrification Administration of the Extension Directorate in the United States Department of Agriculture, through whose efforts over $ 16,000,000 credit has been extended to the rural co-operatives for the supply of electricity.

Some of the other enterprises that the T.V.A. has made possible are the Chemical Factories for the production of munitions, the Atomic Research Centre, the Electric Phosphorus furnace, and the production of calcium metaphosphate, fused tricalcium phosphate, phosphate mining, ammonium nitrate and several other enterprises. During the year, the T.V.A. produced over 33,500 tons of elemental phosphate from its electric furnaces. Part of it was used for the production of dicalcium phosphate, an animal feed developed by the T.V.A. originally but produced by private companies now. The electric furnace, the durable efficient phosphorus producing unit, has been developed to a high degree of success and a simpler and more economical continuous mixing process of concentrated superphosphate, which requires no sulphur or sulphuric acid, has been adopted. Concentrated superphosphate, produced by this improved method, was widely used in test demonstrations on practical farms and its quality effectively proved to farmers. During the year, the T.V.A. produced about 14,900 tons of concentrated superphosphate, which is considered as the 'Key of Life' in the valley. With the help of the U.S.D.A.

Bureau of Chemistry, the T.V.A. has developed a simple process for producing fused tricalcium phosphate ore in a shaft furnace, fired by oil or gas, which does not require sulphuric acid or large amounts of electricity or elemental phosphorus. This fertilizer contains 26% to 30% plant nutrient. In 1951, about 17,500 tons of fused tricalcium phosphate was produced. About 426,400 tons of phosphate matrix were mined from T.V.A's reserves during the current year and over 3,736,000 tons since the operations started. Effective methods for washing the materials have been developed.

The T.V.A. produced over 136,000 tons of ammonium nitrate. This is used partly for munition production and partly for agriculture in a treatment for coating the materials to prevent caking. An improvement has been made in the graining technique which has doubled the output of the graining units. A continuous vacuum crystallization process has been adopted, which operates at low temperature and is considered to be the safest method.

In its land development programme, the T.V.A. adopted a scheme of test demonstration farms on which its plant nutrient materials were used by the farmers. The Test Demonstration Scheme involved the use of fertilizer materials and an improved farming system, employing good land and water management practices. Side by side with this an educational programme regarding progressive farming, soil conservation, etc. was taken in hand. Under this programme, 3,450 test demonstrations are being conducted in the zone. These farms are located in 181 counties in 32 States and cover an area of about 9,504,261 acres; over 67,588 farmers have participated in the programme, either individually or through Community Projects. More than 29,000 tons of fertilizers of different types have been distributed. The use of the fertilizers improved the permanent pastures, increased the yield of crops and reduced the surface run-off, and soil erosion so remarkably that the entire cropping system is now undergoing a rapid change and dairy and livestock farming on grasslands is replacing the old stereotyped row-crop and corn-crop farming.

These fertilizers were mainly distributed through co-operative societies and seven private firms. The Co-operatives sold 272,423 tons of fertilizers during the year and the seven private firms sold over 16,458 tons. The use of the concentrated super-phosphate reduced the distribution cost by half for ordinary 20% superphosphate and four-fifth of the cost per unit for 16% Nitrate of soda.

Integrated development of rural areas through the Community Organisations with the help of the Extension Services, a comprehensive soil survey covering 75% of the total area, production of hard wood in 54% of the land area, demonstration of better forest management methods in about 200,000 acres of woodlands, forest fire control, water control, recreation facilities in the reservoirs, and rearing of fish and wild life are few of the other services of the T.V.A. that deserve special mention.

This in brief is the story of the T.V.A., the story of the Tennessee River that was once turbulent; the river that collected the torrents of rain from the mountains and the valley and in her fury ruined the lives and properties of the people, year after year, and kept the men and women of the valley in constant fear. To-day, she moves gracefully and rhythmically to the dams and then through the huge steel tubes to the water wheels and transforms her energy into electricity that changes the inert phosphate ore into chemical fertilizers and thus gives new life and vigour to the soil and then returns to the man-made reservoirs and from there back to the soil again. The turbulent river that once destroyed life, today gives and sustains life.

THE UNITED STATES DEPARTMENT OF AGRICULTURE

The aim of the United States Department of Agriculture is to render the best possible service to the public. The United States Department of Agriculture is said to be the number one department of the U.S. Government. George

Washington was greatly interested in agriculture. Abraham Lincoln knew that in whichever way the new country and her people grew, a sound rural economy and steady development of the rural areas and land resources was fundamental for building a great nation. It was fortunate that the successive heads of administration kept this objective clearly in view and built up the United States Department of Agriculture, step by step. The people of the United States consider the United States Department of Agriculture as a department of the people, while the employees of the U.S.D.A. consider their lives dedicated to the development of agriculture and the rural economy.

The U.S.D.A. today is a complex organisation. The Secretary of Agriculture represents the people and is the head of the Department. He is assisted by an Under Secretary. The Secretary of Agriculture has under him the following seven independent agencies :—

(*i*) Office of Personnel.
(*ii*) Office of Budget and Finance.
(*iii*) Office of Plant and Operations.
(*iv*) Office of the Solicitor.
(*v*) Office of Information.
(*vi*) Office of Foreign Agriculture Relations.
(*vii*) Office of the United States Department of Agriculture Library.

The Office of Personnel plans and directs the personnel management programmes of the department. It deals with classification of positions, appointments, investigations, employee welfare and safety, training of personnel and employee health programme.

The Office of Plant and Operations deals with real estate, housing, space management etc., records, equipment and engineering services, communication services and transports, printing, photographic and duplicating services, Central stores and supply.

The Office of the Solicitor provides legal advice and service. It gives speedy legal opinions, deals with contracts, titles, administrative rule making and adjudication, renders

counsel for different credit co-operatives, federal crop insurance plans and deals with litigations.

The Office of Information provides Press and Radio Services, produces and distributes bulletins, motion pictures, and prepares exhibits, etc. etc.

The Office of Foreign Agriculture Relations deals with matters concerning agriculture of other countries. It provides information to people of the United States on foreign crops and markets, promotes foreign agricultural trade, and assists other countries in the development of their agriculture. This is the branch that deals with visitors from other countries who visit U.S.A. for the study of agriculture and rural conditions in the country.

The U.S.D.A. Library Office collects agricultural literature from all parts of the world and makes it available throughout the country, through its main library, by the loan of publications through several field libraries and through the photo copying service.

With these seven agencies, the Secretary of Agriculture operates directly the two major arms of the department, viz., the Research Administration and the Extension Services, together with the eight service agencies viz. the Farmers' Home Administration, the Farm Credit Administration, the Rural Electrification Administration, the Forest Service, the Production and Marketing Administration, the Commodity Credit Corporation, the Federal Crop Insurance Corporation and the Community Exchange Authority.

The Farmers' Home Administration deals with loans to farm families and also provides guidance for home improvement through better practices. It also grants loans for the ownership of farms by tenants, addition of lands in the existing small farms and other improvements of farms, such as, terracing, draining, development of pastures, buildings, etc. Application for loans require recommendation from the County Farmers' Home Administration composed of three farmer members.

The Farm Credit Administration supervises all types of Farmers' Co-operative Societies, such as the 'Production

Credit Associations' which make short-term loans; the Farm Loan Associations and Land Banks, which make long term loans on mortgages of lands; the Bank for Co-operative Associations, which lends money for marketing, purchases and other business enterprises.

The Rural Electrification Administration endeavours to extend electrification in the rural areas. It grants loans to Co-operative Societies and public bodies to build rural power lines and to assist co-operatives to construct, manage and operate electrification enterprises. It also helps in the extension of telephones and advises on the best use of electricity in farms and farm homes.

The Soil Conservation Service directs research on problems of soil erosion and methods for soil conservation, water conservation, and wise use of land. It operates both on individual farms and on entire catchment areas of particular regions. In 2,276 soil conservation regions it renders technical assistance to farmers.

The Forest Service protects and manages the timber, water, forage, recreation and wild life resources of the country. It encourages growth of private forests, directs new plantations and carries out research in forest products and water-shed management.

The Production and Marketing Administration administers 47 Congressional Acts on production and marketing. This is purely an action agency organised on the basis of functions and commodities. On the functional side, food distribution, transportation, warehousing, agricultural conservation programmes, grant of funds and subsidies to functional programmes are its main activities. On the commodity side, it has separate branches for cotton, dairy, fats, oils, fruits, vegetables, grain, livestock, poultry, sugar, tobacco, etc. The National School Lunch Programme, which makes low cost lunches available to children, is administered by the Production and Marketing Administration. It also supplies schools and charitable institutions the surplus perishable commodities at low cost. The Production and Marketing Administration collects information on prices

of farm commodities and issues consolidated market price news timely. It operates Regulatory Acts on prices to ensure fair marketing practices.

The Commodity Credit Corporation is the financial agency through which the prices of farm commodities are maintained by loans or purchases. The price information collected by the Production and Marketing Administration is studied carefully and supposed prices of commodities are arrived at by the Board of Directors of the Commodity Credit Corporation a year ahead which, in accordance with Congress legislation, is put into effect by the Production and Marketing Administration through the nation-wide Farmers' Committees. Through this agency also the foreign and the domestic agricultural supply programmes are carried out.

The Federal Crop Insurance Corporation offers insurance on wheat, flax, cotton, tobacco and maize in the main areas of production. A multiple insurance plan, designed for diversified farming areas, is also operated for protection of several crops under one policy. At the moment, it does not include all counties but the plan is expanding. This agency draws plans, decides rates, adjusts claims for loss, and pays the indemnities. The Production and Marketing Administration Committees execute the contracts, gather reports on planted acreage, and collect premium.

The Commodity Exchange Authority is responsible for the maintenance of fair play and honest dealings in agricultural commodities, prevention of cheating, fraud, 'cornering', price manipulation, and the spreading of false information to influence prices, etc. It publishes current information on trading in commodities and also supervises the trade futures.

THE RESEARCH ADMINISTRATION

The Research Administration comprises the following eight divisions:

(1) The Office of Experiment Stations.
(2) The Bureau of Agricultural and Industrial Chemistry.
(3) The Bureau of Plant-Industrial Soils and Agricultural Engineering.
(4) The Bureau of Entomology and Quarantine.
(5) The Bureau of Human Nutrition and Home Economics.
(6) The Bureau of Dairy Industry.
(7) The Bureau of Animal Husbandry.
(8) The Bureau of Economic Research.

The office of the Experiment Station deals with the administration of Federal grant funds for research experiment stations and co-ordinates the same with similar research of the United States Department of Agriculture and the researches in Universities and Colleges. It also operates the federal tropical experimental stations. This Bureau takes an active part in the planning and co-ordinating of regional and fundamental research done throughout the country.

The Bureau of Plant-Industrial Soils and Agricultural Engineering carries on research on soils, soil management, forests, better plants and machineries, etc. Its research activities include also such subjects as storage, transportation, housing, etc.

The Bureau of Entomology and Quarantine conducts research on insects, their classification, biology, habits, etc., develops methods and equipments to control injurious species by the use of beneficial insecticides, draws up co-operative insect pest and plant disease control measures, suppresses or controls incipience of different products, suppresses and eradicates pests, combats emergency pest attacks, etc. It operates the plant quarantine activities directed

towards the prevention of entry of insect pests and plant diseases from abroad and the prevention of the spread of established pests to new areas. It co-operates with the state and local branches in their programmes regarding the control of pests and diseases.

The Bureau of Human Nutrition and Human Economics conducts research on food and nutrition, textiles and clothing, housing and household equipment and family economics.

The Bureau of Dairy Industry conducts research in the breeding, nutrition, feeding and management of dairy cattle with a view to developing more efficient herds. It also conducts research on dairy products and by-products.

The Bureau of Animal Husbandry deals with the eradication and control of Livestock diseases and parasites, development of better livestock through breeding and management, inspection of livestock imported and exported, sanitary control of imported animals' products and administration of the Federal Meat Inspection Act.

The Bureau of Economic Research and Farm Statistics co-ordinates economic research and statistical work in the department. It deals with crop and livestock estimates, economic research, economic analysis and outlook work. The estimates also include the farm workers, wage rates, farm machines and a wide range of different commodities. National averages of prices received and paid by farmers are published monthly by this Bureau, together with monthly data with parity prices and the basic prices separately. This Bureau deals with prices and marketing, farm incomes, agricultural finance, farm management and costs, land economy, farm population and rural life. Outlook work of this Bureau is of vital importance as from the data supplied by this Bureau, the farmers decide, year by year, the quantity and the commodities that are to be produced in each farm.

THE EXTENSION SERVICES

The second major arm of the United States Department of Agriculture is the well-known and popular Extension Service. This was established to educate the farmers in the use of better methods in farming and to acquaint them with the inventions and improved methods that are constantly being discovered by research. This arm of the United States Department of Agriculture is also concerned with the all round development of rural people through work, recreation, social life, and leadership. The Extension Service operates on the theory that the farm people, both children and adults, learn by doing, under the advice of its agents. Farmers plan their cropping, boys learn to maintain livestock on scientific diet, girls make their own dresses or prepare a balanced diet, the youths meet together and learn to conduct meetings, they collect information and interpret the same, learn co-operative buying and selling or management of a rural organisation through the help of the Extension Service.

The Extension Officers not only bring new methods to farmers but also pick up new ideas from farmers and pass them on to other farmers. The Extension Officers collect problems and pass them on to the Research Arm of the United States Department of Agriculture and to the Universities for research and solution. While the fundamental researches are done by Universities on problems taken up by individual research workers, the Research Branch of the United States Department of Agriculture deals primarily with problems given by the Extension arm, the results of study on which are again taken back to farmers by the Extension workers. The Home Demonstration Agent works with groups of farmers' wives in regular club meetings. Programmes of good nutrition, meal planning, cooking, dress making, home decoration, use of labour saving devices are discussed and adopted.

The Extension Service in the United States of America has grown gradually but its actual formation can be

attributed to the 'Country Life Commission' and the subsequent 'Smith-Lever Act' passed in 1914. The 'Country Life Commission', which was appointed by President Theodore Roosevelt in August 1908, with Liberty Hide Bailey as Chairman, was impressed by the urgent need to make rural civilization as effective and satisfying as urban civilization, and proposed to remedy the lack of adjustment between the city and country by tackling fundamental problems. The most fundamental problem, according to the Commission, was 'Lack of the proper kind of education'. The Commission called for an immediate expansion of the Extension work and stated:

"Education has now come to have vastly more significance than the mere establishing and maintaining of schools. The education motive has been taken into all kinds of work with the people, directly in their homes and on their farms, and it reaches mature persons as well as youths. The arousing of the people must be accomplished in terms of their daily lives, or of their welfare. For the country people, this means, that it must be largely in terms of agriculture."

The Commission recommended the establishment of a nation wide Extension Service and the organisation of "a complete department of extension designed to forward not only the business of agriculture, but sanitation, education, home-making, and all interests of country life". The last phrase proved significant subsequently. "If agriculture represents a civilization," the Chairman wrote, "then the home-making phase of the country life is as important as the field farming phase. As is the home, so is the farm; and as is the farm, so is the home."

In 1914, the 'Smith-Lever Act' was passed creating a nation wide 'Extension Department' with a view "to aid in diffusing among the people of the United States of America useful and practical information on the subjects relating to agriculture and home economics and to encourage the application of the same."

The passage of the 'Smith-Lever Act', establishing the Extension Service on a national basis through independent

Directorates directly under the Secretary of Agriculture, was a significant factor in the history of rural development of the United States of America. Although some sort of extension work was being carried on by different Land Grant Colleges before, with the passage of this act, a national programme of extension work was proposed by the Secretary of Agriculture and adopted. On its part, the United States Department of Agriculture agreed to organize and maintain an independent and responsible administration department for supervision of all extension work, to administer the federal funds, and to carry on all demonstrations and other items of extension work in the rural areas or in the Land Grant Colleges.

The growth of the Federal Directorate of Extension, United States Department of Agriculture, was gradual. To-day it comprises six divisions:

(1) The Division of Business Administration.
(2) The Division of Extension Information.
(3) The Division of Field Studies and Training.
(4) The Division of Subject Matter.
(5) The Division of Field Co-ordination.
(6) The Division of Agricultural Economics.

The Federal Director represents the Secretary of Agriculture in the States, the Counties, and the Colleges. Associated with the Director are a group of administrative officials, Liaison Officers, and Subject Matter Specialists. The Federal Directorate develops policies affecting agriculture. It encourages rural people to utilize fully all available resources in solving current problems and in meeting new situations. It stimulates rural people to improve health, nutritional and economic standards, family and community life, and the general standard of living. It reviews plans of work and budgets of the States. The total staff of the Federal Extension office is about 200 persons, including the clerical staff.

(1) The Division of Business Administration deals mainly with administration, personnel, and budget. Its main functions are :—

(*a*) *Administration:* Plans and co-ordinates personnel, deals with fiscal and other administration matters.

(*b*) *Personnel:* Conducts personnel activities for the Federal headquarters and the field, deals with classification of personnel, appointments, transfers, promotions, retirements, etc.

(*c*) *Budget:* Directs budgetory functions, annual estimates, justifications, allocates funds for various projects, prepares apportionments, etc.

(*d*) All administrative accounting, payroll, audits, financial statements, purchases, maintenance of properties, handling of mails, etc. are also dealt with by this division.

(2) The Division of Extension Information deals with the Press, Radio, Visual Aids, Bulletins, etc. It develops and effectuates programmes of visual and information aids for educational use by the State and County extension workers. It teaches extension workers how to prepare and use information and visual techniques and directs the public relation programme of the Extension Service. It publishes the programmes, the Extension Service Review, the annual reports, and the Federal and State bulletins. It correlates information on extension activities, makes public reports through the press, radio, etc. It distributes materials including slides, movies, photographs, charts, publications, etc.

(3) The Division of Field Co-ordination deals with programme, planning, supervision, agricultural work, Home Demonstration work and 4-H Club work.

(4) The Division of Subject Matter deals with specialists, who advise on different sections e.g. Agriculture, Agricultural Engineering, Home Economics, etc. in consultation with Research Specialists.

(5) The Division of Field Studies and Training deals with Annual Reports, Field Studies, Personnel Training, Foreign Students, etc.

(6) The Division of Agricultural Economics deals with Statistics on marketing, farm management, general economics, agricultural outlook, farm credit, sociology, health, etc.

THE STATE DIRECTORATE OF EXTENSION

At the State level the Extension Director is the administrative head of the State Directorate. It consists of the Director, one or more associate directors, supervisory staff, subject matter specialists, editors, publicity officers, clerical establishment, a group of field agents, and the county extension workers.

The State Extension Director is the leader responsible for the operation of the Directorate in the State. He is responsible for the administration and execution of all duties and obligations agreed upon by the Land Grant Colleges and the United States Department of Agriculture. He administers all funds, looks after all projects and plans, examines and approves all publications, and is the link between the State and the United States Department of Agriculture in matters of rural development.

I. Directorate Office deals with :—

(1) Administration of State and Federal Extension Laws.
(2) Finance, including purchase of equipment and supplies, financial arrangements with counties.
(3) Plan of organisation, functions to be performed and how best handled.
(4) Assignment of duties and delegation of authority.
(5) Policies and operative procedures to be followed.
(6) Personnel appointments, salary scales, promotions.
(7) Relationships with experiment stations, making available the results of research, and suggesting problems needing further study.
(8) Relationships with other State Departments, farm organisation, and agencies, concerning rural problems.
(9) Integration and co-ordination of activities in terms of common objectives.
(10) Accounting of moneys expended and results obtained.

II. Field Staff

The Director supervises directly the members of the Extension staff e.g., Assistant Directors or State leaders of field work, County Agents, Home Demonstration Agents, 4-H Club and Specialists etc., who are indispensable to the activities of the Directorate.

The Supervisors under the State Directorate

The Supervisors are the representatives of the State Director and his eyes and ears. The Supervisor interprets Extension objectives, methods and procedures to the County personnel and often also to the people. He brings back to the State Director information on problems, needs and activities of the agents and the people. The Supervisors, like the Deputy Directors of Agriculture in progressive States in India, are functional and are designated differently. One may supervise the work of the County Agents, another of Home Demonstration Agents, and yet another of the the activities of the 4-H Clubs. The Supervisors assist the State Director in selecting personnel, in imparting training to inexperienced agents, reviewing activities in counties and advising modifications for a well-balanced and co-ordinated programme. They are the links between the County and the State Director. The Supervisors are responsible for:

(1) A sound well-balanced rural programme in every county.
(2) A co-ordinated approach to the solution of the problems of rural people.
(3) Planning, organizing, financing, and directing County Extension work.
(4) Effective working relations with the Extension Service and other related groups.
(5) High morale of the County Staff and satisfactoin in their work.

The State Subject Matter Specialists

Each such specialist usually deals with one subject, but in some counties he has to deal with several. The Subject Matter

Specialist represents a subject matter department of the United States Department of Agriculture, the Research Stations and the Land Grant Colleges. On behalf of the Director, he assists the County Agents in their subject-matter programme. These Specialists are absolutely necessary for sound technical advice on specific lines to the County Agents in their varied activities. They are the analysts and interpreters of scientific knowledge and factual information and are the connecting links between research and practice. They enable the County Agents and the people to understand and to apply scientific knowledge on specific subjects in the farms, homes, community organizations or marketing societies. With the help of the Extension Editor they prepare simple bulletins, leaflets, slides, exhibits, motion pictures, etc. and various other subjects from the complicated and detailed Research Bulletins issued by the Research Sections. The Specialist is an interpreter of scientific findings for practical application.

The County Agents: The County is the crucial unit in Extension work. The County Activities are centred around the County Agent, who in most cases, is assisted by a Home Demonstration Agent and an Assistant County Agent. Some Counties have an Assistant Agent to deal specially with 4-H Clubs.

In the Extension organisation, the office of the County Agent is a vital institution. The County Agents are teachers of improved farming and better home living. They work through field demonstrations, group meetings, personal visits, letters, bulletins, news articles, radio talks, etc. The agents take research findings to farm people, and they carry back to the research specialists the unsolved problems of the farmers.

The office of the County Agent consists of only four persons: the County Agent himself, a lady Secretary who deals with all office routine duties, an Assistant County Agent, and a Home Demonstration Agent. There is no paid staff below at the ground level as it is considered that only an adequately trained person can impress the sceptical farmer and the rural people. The County Agent and the two associates, therefore, operate through rural organisations

e.g., the Community Clubs for men and women and the 4-H Clubs for the children.

The County Agent cannot reach every individual farmer frequently and has, therefore, to approach and enthuse all through organized groups. Such groups are either based on a particular commodity or are multipurpose clubs. The Commodity organisations, such as for dairy, fruit, cotton, tobacco, vegetables, etc. suffer from the defect that only one particular group is dealt with through such organisations. Special programmes such as for home demonstrations or 4-H Clubs, cannot be fitted into these organisations. A family unit approach, which is now considered to be ideal, becomes impossible, and although the County Agent does not ignore these organisations he cannot achieve best results through these. The 'Whole Community' organisations, with different clubs as the Farmers' Society, Women's Club, 4-H Club, have proved more useful organs for approach. This form of organisation promotes unity of feeling and purpose, develops leadership among members, and also provides a social outlet for the rural population in the rather dreary environments of rural life. Of the various organisations through which the County Agents operate the following deserve special mention:

I. *The Farm Bureau:* This was organized in 1920 as a federation of State Farm Bureaus. It has a total membership of 1,430,000 families and operates 2,600 County Farm Bureaus in 45 States. The Farm Bureau exerts strong influence on the national farm policy, the Congress Acts relating to agriculture and the consequent activities of the United States Department of Agriculture. The State Bureaus under the Farm Bureau maintain marketing and purchasing co-operatives and offer many other services, including insurance. This organisation is said to be businesslike and aggressive.

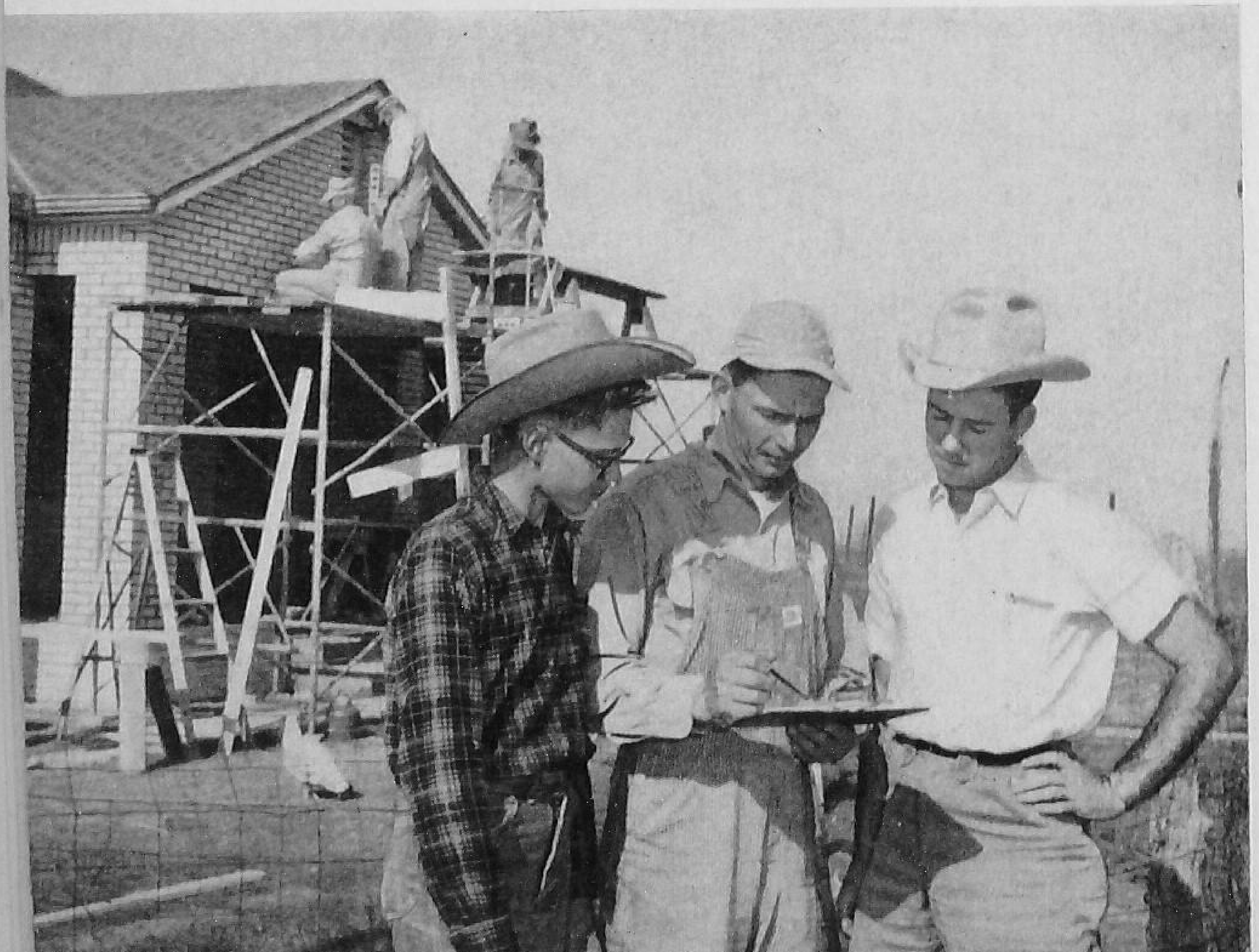
II. *The National Grange:* This has branches in 37 States with 8,40,000 members. It is a family

Livestock is an important factor on most American farms. An assistant county agent shows 4-H Club members how parasitic diseases of cattle can be controlled

The farm family is the primary concern of the U.S. Agricultural Extension Service. A Home Demonstration Agent (third from left) is teaching farm women how to use pressure cookers

Oklahoma farmers have built over 1000,000 ponds during the past 20 years with the help of the Extension Service and other agencies. A county agent (centre) is inspecting a pond for erosion, silting and possible under-cutting

A farmer (centre) and his son discuss plans for remodelling their home with the county agent



organisation with men, women and children as members. This is the oldest general farm organisation having been organized as early as 1867. It has many farmers' co-operative associations. Lectures and discussions on farming, home-making, etc. are a few of its main functions. It takes research findings to farmers and provides for teaching agriculture in schools and colleges. It improves credit facilities and encourages soil conservation. The Grange believes in Community Service. It takes up beautification of public properties, equips volunteer fire departments, sponsors agricultural fairs, soil conservation demonstrations and improves recreation areas.

III. *The National Farmers' Union* has 525,000 members. Its basic purpose is to strengthen the family farm. Discussions on current issues are held and summer camps for recreation and to train young people are organized. It operates many co-operatives and endeavours to ensure reasonable taxes on farmers and security to the farm population.

IV. *Home Demonstration Clubs:* These clubs are formed by about 12 to 25 women in a locality on a community basis. Each such group elects the usual officers and plans its own programme. Lectures and training, programme of work and competition regarding improvements in home and facilities in domestic work are its main features. Refreshments and social hours are usual features of club meetings in addition to demonstrations, training and other educational programmes. The individual clubs organize into County Home Demonstration Council and finally a State Council. The Home Demonstration Clubs take up projects in improved facilities in the kitchen and domestic functions, house decorations, kitchen gardening, preservation of food, home industries, balanced dieting, general education and community

entertainments, such as (1) Food selection and preparation; (2) Making and using a fiireless cooker; (3) Care of Poultry; (4) Year round garden; (5) Rug and curtain making; (6) Clothing; (7) Use and care of milk in the home; (8) Eradication of household pests; (9) Soap making; (10) Bed making with and without patients in bed; (11) Making and applying bandages; (12) First Aid; (13) Making an improvised rubber sheet; (14) Sanitary drinking cups; (15) Personal hygiene, etc.

V. *The 4-H Club:* This organization has an annual membership of about $1\frac{3}{4}$ million boys and girls and aims at training rural children to help themselves and to learn subsidiary farming practices, such as, rearing of livestock, poultry, home gardening, etc. The 'H' stands for head, heart, hands and health and programmes of activities in the 4-H Clubs are designed to cover all the four aspects. The 4-H clubs deal with agriculture and home economics and members take up various projects, such as, raising of a calf, growing an acre of some crop, making a dress or hat, canning, selecting seed corn in the field, selection and care of a dairy cow, banking sweet potatoes, cutting and building steps, etc. The girls take up most of the projects taken up by women in the Home Demonstration Clubs. The 4-H Club organisation is vitally important in Extension work and has made significant contribution to the out-of-school education of rural children and in building up better rural homes. This is an organisation of boys and girls from ten to twenty years of age. It is part of the national agricultural extension system, and was organized by the United States Department of Agriculture in co-operation with Colleges, States and Counties. The 4-H Club has eight major educational objectives.

(1) To afford rural boys and girls technical instruction in farming and home-making.

(2) To assist rural boys and girls to develop ideals for improved farming, home-making, community life and citizenship together with a sense of responsibility for their attainment.

(3) To provide rural boys and girls an opportunity to 'learn by doing' through conducting certain farm and home enterprises and demonstrating to others what they have learned.

(4) To help the rural youths to have intelligent understanding and appreciation of nature and of the environment in which they live.

(5) To teach rural boys and girls the value of research, and to develop in them a scientific attitude towards the problems of the farm and the home.

(6) To train rural boys and girls in co-operative action so that they may increase their accomplishments and through associated efforts assist to solve rural problems.

(7) To develop in rural boys and girls habits of healthful living; to provide them with information and directions in the intelligent use of leisures and to arouse in them worthy ambitions and the desire to continue to learn, so that they may live fuller and richer lives.

(8) To teach and to demonstrate to rural boys and girls improved methods and practices in agriculture and home-making that may increase farm incomes, improve standards of living, and enhance the satisfaction in farming.

4-H Club Creed:

(1) I believe in 4-H club work for the opportunity it will give me to become a useful citizen.

(2) I believe in the training of my HEAD for the power it will give me to think, to plan and to reason.

(3) I believe in the training of my HEART for the nobleness it will give me to become kind, sympathetic and true.

(4) I believe in the training of my HANDS for the dignity it will give me to be helpful, useful and skilful.

(5) I believe in the training of my HEALTH for the strength it will give me to enjoy life, to resist disease and to work efficiently.

(6) I believe in my COUNTRY, my STATE, and my COMMUNITY and in my responsibility for their development.

(7) In all these things I believe and I am willing to dedicate my efforts to their fulfilment.

The 4-H Club Pledge:

I pledge:
My Head to clearer thinking
My Heart to greater loyalty
My Hands to larger Service and
My Health to better living for
My Club, my Community and my Country.

The 4-H Club Motto:

"TO MAKE THE BEST BETTER"

The 4-H Club Emblem:

The 4-H Club emblem is a FOUR-LEAF CLOVER OF GREEN with the letter 'H' in white on each leaf. The flag is on a white background which represents purity while the green leaves represent youth, life and growth.

EXTENSION PROGRAMMES AND PLANNING

Extension has no universally applied programme. The programmes, in 84% of the 68,494 localities, were worked out by the local committees together with the County Agents of the Extension Service. The programmes are based on local problems and originally initiated by the local Committee for each individual farmer. The County Agent helps to make the programme as correct and fruitful as possible by the application of his scientific knowledge and through discussion. The programmes from the local committees, after approval by the County Agent, are considered at the State Director's office both in regard to the technical aspect as well as the state resources available to assist the implementation. The tendency for the State office to plan and to formulate a programme is discouraged and is fast declining. Dr Knap, a pioneer on successful extension work, held the view firmly that objectives were best achieved when programmes were initiated by people themselves and responsibility of execution taken by them provided that these were formulated in consultation with the local Extension Official. While the programmes might best be formulated initially by the local committee, it was essential that the County Agent and the State Director reviewed the plans as local plans were often loaded with a variety of miscellaneous projects and were too cumbersome for effective operation. It was also the responsibility of the County Agent and the State Director to formulate the plan in terms of the major needs of the County concerned viewed as a whole. The programme may be on machinery, homes and other buildings, on production schemes, on insects and diseases, on business and marketing, or on 4-H club; whatever it may be, it must be formulated as a total plan and the State Director has, therefore, to review the plans in a wider perspective.

It is considered that the environment, habits, customs, and culture of the people concerned must be taken into consideration in making a programme or plan. In other words, it must

be psychological rather than merely logical. It is advocated that success in Extension work requires group action, and group support. An Extension programme is for the whole community: men, women and youths. The use of the local materials for development of an extension programme must be adhered to strictly. A farmer is too much involved in his immediate problems. Any plan which does not touch his own immediate problem can, therefore, hardly enthuse him. Any extension programme which fails to use local materials, and to provide adequate ways and means for people to get the requisite supplies from local resources, is bound to fail. The United States Extension Service succeeded in the clover and alfalfa raising programme because, with foresight, they utilised local sources of limestone and made those available without difficulty and at less cost; the 'food-for-health' programme succeeded because whole-grain cereal foods and vegetables were made available in the localities; the 'Grow healthy chicks' scheme succeeded as disease-free flocks were made available nearby.

Extension experience in programme planning for over 35 years in the United States of America has led to the opinion that programmes should be planned with the people concerned and not for the people alone; that programmes cannot be determined solely by the people but official agencies must give the guidance and leadership. They must be formulated in a spirit of 'give and take' between the people and the state agencies.

Local leadership is indispensable to development and execution of a programme. The annual programme should be a composite of the problems of the County, as expressed by the farmers, their wives, and as interpreted by the Extension County Agent on the basis of his own knowledge of experience and findings of the Experiment Stations. It is also emphasised that any programme must be based upon facts which would justify the same. Programmes should not only be useful but also profitable. If a change of practice is advocated, it must be economically practicable and logical. In drawing up a programme the principle that any effective result cannot be hurried and the process will require time should be recognized. Programmes must, therefore, be drawn

up well ahead and the time lag for any appreciable result should be borne in mind. An important principle advocated is that one should always hold the big idea foremost to the people when new things are taught. Too many ideas at a time may be confusing. Farming and home management, agricultural prosperity and village or town welfare, cannot be isolated and are interlinked. All should, therefore, be considered in planning as well as in the execution of any Extension project. Above all, the Extension worker must impress upon the people that standing together they have everything to gain but divided and alone they lose by inefficiency and ignorance.

METHODS AND MEANS OF EXTENSION TEACHING

Extension teaching is fundamentally a system of out-of-school adult education. It differs from class room teaching in the sense that it follows no rigid pattern or curriculum; it is based on the needs of the people in a particular locality; it is voluntary; it ensures attendance by its service in reality; it accepts persons of all ages and levels of living or cultural background. Obviously, therefore, methods and means of teaching must be practical and effective. The methods may be classified broadly into two: Objective methods and Oral methods. The Objective methods are mainly:

(1) Method demonstration;
(2) Result demonstration;
(3) Exhibits;
(4) Filmstrips;
(5) Motion Pictures; and
(6) Television.

Methods demonstration shows how to carry out a given practice, the technique of a farm or home practice, such as, culling of poultry flock, pruning or grafting a tree, mixing concrete, construction of houses, inoculating legume seeds, canning vegetables, maintenance of tractors, etc. The method

demonstration teaches skills effectively; motivates and stimulates action as a result of hearing, discussion, and seeing; it develops leadership; it builds confidence both in the teacher and the pupil; promotes personal acquaintance; serves as a news agency and stimulates publicity; and it accomplishes changes in practices at little cost. The success of this method is mainly dependent on the ability and skill of the teacher and this method requires considerable preparation. In Tuskegee area, the Negro Extension Service has adopted a system of Movable School under Method Demonstration. This system is very useful for areas where people are handicapped by inadequate means of transport. The Agents carry their equipments, and hold these Movable Schools for successive days in particular regions. This system is particularly suitable for people of low income and should be a useful method for small cultivated areas.

(2) *Result Demonstrations:* This method demonstrates the results of a recommended practice in comparison with the former practice under actual existing conditions. This method may be used to prove that application of fertilizer will increase yields, or proper diet improves health, or the certified seed increases yield. To achieve effective results the Extension Officer, however, must give close attention to the demonstration. This method furnishes local proof of a recommended practice. It is effective for new recommendations. It proves the theory that 'seeing is believing'. It provides an excellent source of information; furnishes cost data and other basic information, develops leadership and creates confidence in the Extension worker.

(3) *Exhibits:* This is an effective method of teaching. Wide range of subjects can be dealt with by this method. To make the exhibits effective, it is necessary to use one idea or a few related ideas and to avoid abstract ideas; further, the idea or the component parts of the idea should be simple and clear. This method is effective in rousing interest.

(4) *Filmstrips:* These appeal both to the eye and ear and are now widely used. Projectors are generally of tri-purpose type i.e., they may be used for projection of single and double

strips for 2×2 inch slides, either black and white or coloured. The United States Department of Agriculture maintains about 400 filmstrips covering a wide variety of subjects which are lent to the States for use.

(5) *Motion Pictures:* This method also gives convincing proof and creates interest easily. The United States Department of Agriculture has a film library which contains a wide variety of well-known films, such as, 'The River', 'The Plough that Broke the Plains', etc. These are lent to counties. Some County Agents make their own pictures on local subjects to arouse local interest.

(6) *Television:* Although this is still (1952) not much in use it is gaining popularity and promises to be an important media in future.

The oral methods mainly comprise:

(1) Farm and Home Visits;
(2) Office and Telephone Calls;
(3) Meetings;
(4) Radio.

(1) *Farm and Home Visits:* These create a cordial relationship, develop good will and make the idea of 'give and take' possible in extension work. The visits, however, take up considerable time and only a few visit or visits to a few farms are practicable. But they provide an opportunity to the Extension workers to gather first-hand knowledge of actual conditions. For this reason they are considered a vitally important method and the County Agents are required to report the number of visits they make.

(2) *Office and Telephone Calls:* This is a direct and effective method and is widely used in the United States of America.

(3) *Meetings:* This method brings the extension worker in close touch with many persons. The average Agricultural Agent holds over 200 meetings a year and the average Home Demonstration Agent attends 300 a year. Meetings are more effective when they are followed by discussions.

(4) *Radios:* Over 90% farm homes have radios. The programmes in the form of interviews have been found effective both in the case of agriculture and home economics.

The use of radio for extension work is gaining prominence. About 300 stations regularly broadcast Extension information programmes. The National Farm and Home Hour organised by the United States Department of Agriculture is a popular feature. This programme brings technical and socio-economic facts to farmers every Saturday. The annual report of the Extension Service for 1947 shows 6,800 talks given on radio in 1,900 counties. The radio programmes such as 'Let's make a dress' and 'Repair of hats', etc. are very popular.

The media through which Extension teaching is mainly carried on in addition to the methods stated above, are printed materials, such as, bulletins and circulars, news stories, circular letters etc. Bulletins and circulars are utilised extensively by the United States Department of Agriculture, the Experiment Stations, and the State Extension Services. Printed mimeographed materials containing results of research are widely distributed. It is estimated that over 30,000,000 of such bulletins are issued every year. The average County Agent distributes over 4,000 bulletins and Home Agent about 1,000 a year. The United States Department of Agriculture is constantly evaluating the effect of the bulletins and endeavouring systematic improvements. It is stated that 10 to 12 pages have been found as the optimum length of bulletins in respect of readability. Simplicity has been made the keynote. For example, use of 'Photo-synthesis' is advocated, wherever possible, to enable farmers of average educational status to understand more easily. Special articles in newspapers on 4-H Club work, Home Demonstration work, and agricultural development have created great interest in members in different activities. On the average, a County Agent writes about 14 articles a month, and the Home Agent ten or eleven. It is advocated that these should be timely, accurate, concise, simply told, and, whenever necessary, given a local colour. Circular letters carefully planned, on a wide variety of topics and research findings, are also used widely. These are illustrated with good drawings, diagrams, cartoons, pictures, etc., and are usually printed on excellent paper.

THE TRAINING OF EXTENSION PERSONNEL

The Extension programme in the United States of America to-day covers a wide variety of fields and a well-planned training programme is an essential part of it. There are over 12,000 persons in the Extension Service and over a million volunteer local leaders. The training plan may be classified under pre-employment, apprentice or induction, and in-service training.

The pre-employment training is developed on the following nine principles :

(1) Basic grounding in rural areas.
(2) Familiarity with reliable sources of information.
(3) Background, Philosophy, Objectives, Policies and Organisation of the Extension system.
(4) Skill in applying principles of psychology and education to extension teaching, supervision, and administration.
(5) Ability to organize rural people and stimulate leadership among them.
(6) Understanding of the process by which rural people and extension workers in co-operation can analyze local problems, arrive at potentially sound solutions and develop county extension programmes.
(7) Knowledge of the problems and procedures of adult and out-of-school youth education.
(8) Skill in organizing, interpreting and presenting basic, economic, social, technical and scientific data, and their implications in rural life.
(9) Understanding of the techniques and processes of evaluating the effectiveness of an extension programme.

On the basis of these principles the courses prescribed are as follows :

(1) The major subject matter : fields in agriculture or home economics and the basic natural science on which this subject matter is based.

(2) Basic training in the Social Sciences, on cultural understanding, social and community organization.

(3) Basic courses in education, adult education, including psychology and subjects dealing with extension organization, history, philosophy, methods, etc.

The Apprentice training is given for three months during the students' senior and junior years under an experienced County Agent. The in-service training is designed to increase the employee's proficiency by keeping him up-to-date on the findings of research and study on the wide spheres of his activities. In addition to regular courses for 2 or 3 days, discussion and seminar, conferences, visits, etc. form part of this course. Study in workshops, clinics, summer schools are a special feature of the in-service training of personnel.

EXTENSION PHILOSOPHY AND PRINCIPLES

Extension, as conceived in the United States of America, is an out-of-school education system. It is primarily a method of rural education and its central task is to help the rural people help themselves by applying science and knowledge to the daily work on the farm or in the home. The plans of this education emanate from the needs and problems of rural areas and rural people and aim to effect an all-round development of the rural areas and to bring about better homes to live in, better farms to feed and clothe the people, and better communities. The training under this system is not confined to school rooms but extends to the lands, the kitchens, the homes and the communities. To quote the Federal Director of Extension, United States Department of Agriculture, Mr M. L. Wilson, this constructive endeavour is aimed to develop "a rural civilization based on scientific knowledge, a civilization in which rural people would have a way of living which would give opportunity for individual and group realization of the best values

inherent within them". Such being the case, Extension is not confined to any single aspect of rural life. It is fundamentally concerned with the growth and improvement of the individual in his endeavour to better his living and is based on the principles of self-help. No single factor can improve an individual, nor can any factor be isolated to achieve a comprehensive change. The home is as important as the farm, and it is the people who make homes or farms good or bad, or a nation great or small. Extension work must, therefore, be comprehensive and all programmes for the improvement of food, health, education and income, in fact, all the factors that make better living a reality must be integrated.

Nevertheless, as far as the rural areas are concerned, food is the basic factor. That is the reason, although the Extension Directorate in the United States deals with all aspects of rural welfare, food, health, rural electricity, rural education, rural housing, etc., it is organisationally under the United States Department of Agriculture. Increased production of food and fibre, therefore, is the essential primary factor for all rural development. An increased production calls for not merely resources and scientific ingredients that stimulate production, it also demands a deep-seated enthusiasm for the purposes in the heart of the people, the urges for scientific knowledge, the determination for its application, self-reliance and courage. Extension teaching, therefore, starts with the basic factor, food, and the factors which also simultaneously develop human qualities.

Extension is democratic in procedure and philosophy. It does not give orders, nor does it advise; it rather aims to operate by discussion and suggestion. Co-operation with the people is, therefore, of fundamental importance. Any plan in which the people have not participated, whether in the initial stage or during execution, can hardly succeed. Plans in which the people have not taken the responsibility and borne the cost can also hardly give any lasting benefit. Participation of the people, therefore, is a primary factor. The people must share in the development programme.

They must feel that it belongs to them and must accept it as their own.

The first principle of Extension, therefore, is that the greatest possible latitude is necessary in regard to programmes and methods to fit local conditions, local resources, finance, human materials, environments, traditions, cultures, habits, and total needs.

The second principle is the understanding of local culture and harmony in method. Even the beliefs, practices, values, taboos and faith require careful understanding for formulation of any plan that can be worked harmoniously.

The third principle is that the Community must be regarded as the basic unit of work. The village is the backbone of a nation; even so in the United States of America and other industrialized countries. The voice of the village must, therefore, be heard. The Extension worker must start with the village institutions, the village leaders and the elders, the village schoolmaster and the preacher, the *panchayats*.

The fourth principle is that the home must also be regarded as a basic factor. The efforts for increased production and education are but the means; the home and better living is the objective in the end. The home must, therefore, be treated as the second basic factor, the farm being the first.

Under the circumstances, it is obviously essential to start with the simplest of ideas. Even the most pressing need, if difficult, should be deferred till the people are ready to accept the solution. Only when the community has learned to work together and has confidence necessary for tackling major problems should they be taken up.

Local leaders should be used as responsible representatives and the community should be approached through them. For tackling a village problem local leaders are of far greater importance than the state or National leaders. For, they share the joys and sorrows of the people and are apt to be heard more than those from the outside. Successful Extension is a two-way process. The Extension worker must be prepared to learn from the people and at the same time

to teach. A good teacher is always one who is also a good student and is ever prepared to learn.

The Extension worker must be willing to serve all and must not discriminate. This is a profession inspired by the faith of service to the cause of uplift of the rural people and a philosophical attitude to creeds, colours, races and problems is, therefore, essential.

The utility of demonstration is of the greatest importance, particularly in backward conditions. The farmer and the housewife must be shown the 'do-how' and not merely be left with the 'know-how'.

In the United States of America, the Extension work has clearly been defined as education work. It has, therefore, no regulatory or police duties which are considered incompatible. It has been stressed over and over again that when in the interests of economy, it has been combined, the educational aspect has always suffered. This point has been stressed by most of the Commissions that have examined the working of Extension in the U.S.A.

PART II

JAPAN

THE ISLANDS OF CHRYSANTHEMUMS & CHERRY BLOSSOMS ● OF STURDY & VIGOROUS PEOPLE THAT STRIVE HARD IN CEASELESS SILENT EFFORTS FOR THE PROGRESS OF THE NATION ● THE GREAT PEOPLE OF THE EAST UNDER THE RISING SUN THAT BOWS TO ALL IN HUMILITY AND STILL RETAINS ITS HEAD HIGH IN GLORIOUS ACHIEVEMENTS

Itinerary, Background, Rice Cultivation, Farm Economy, Village, Machines, Co-operatives, Insurance, Land Reform, Ministry of Agriculture, Research and Extension Services

"O beautiful for spacious skies,
For amber waves of grain,
For purple mountain...."

KATHERINE LEE BATES

THE ITINERARY

After a study of the basic facts at the Ministry of Agriculture in Tokyo, a tour of the rural areas by train, accompanied by high Japanese officials of the Ministry of Agriculture, a representative from the United States Embassy and Chairman of the Indo-Japanese Cultural Relations Society, was undertaken. The places visited were Niigata, Nagaoka, Kyoto, Okayama, and Fukuoka Prefectures. The major portion of the country was thus visited by train, bus and motor launch and rural conditions and village organisations were studied. Several Research Centres, Rural Schools, Co-operative Societies, Agricultural Machinery Factories, etc. were visited together with State and Village Administrative Centres. The cordial reception in all the Prefectures was most gratifying. The hospitality and the kind and courteous treatment received all over the country made one feel very grateful to the Japanese Government, their officials, and the Japanese people.

In Niigata, the Agriculture Department of the Prefecture, Experiment Station, Farm Youth Training Centre, and activities of the Extension Adviser and the Subject Matter Specialist were studied. The Prefecture has 79% of the total agricultural land in Japan and 70% of the crop is paddy. Individual farm land is 1 cho 1 se or about 3 acres per family while the national average is 8 tan 2 se or about 2 acres. It is stated that 55% of the farmland is held by farmers whose holdings are between 5 tan or 1¼ acre and 2 cho or 6 acres. Live-stock is on the increase and the Prefecture has 3,267 milch cows, 67,244 animals for plough and meat, 16,994 horses, 17,236 hogs, 7,824 sheep, 15,219 goats, 54,751 rabbits and 477,580 chickens. Cocoon crop per sericulture family is worth about 35,000 yen per year. This is an agricultural Prefecture. Double cropping is being

encouraged and drainage, land reclamation, and livestock improvement are being stressed to increase the income. The Prefecture has 478 Agricultural Extension workers who work in co-operation with the Agricultural Associations. Under the 'Agricultural Commission Law', an Agricultural Commission has been established which operates the village Agricultural Associations and also discharges the following functions:

(1) Agricultural Improvement Plans.
(2) Exhibitions, Prizes, Training School, etc.
(3) Farm Practice or Demonstrations.
(4) Youth Clubs.
(5) Rural Community Organisations.

The Niigata Agricultural Experiment Station has 31 Scientists, 34 Asstt. Scientists, 2 Professors, 2 Asstt. Professors and 25 other personnel. It deals with Rice, Upland Crops Phytopathology, Entomology, Agricultural Chemistry, Farm Management, Implements, etc. The farm is small but well kept. In the Rice Section, apart from rice breeding, the study of the vegetative propagation method of rice, multiplication of the best mother seeds and rice seedlings and a study of the direct sowing method under deep water are being carried out. In the Chemistry Section, studies on the non-sulphuric and sulphuric fertilizers, the utility of the F.Y.M., experiments on fertilizers for rice, are being conducted. In the Farm Management Section, rice culture management in small farms, rice cultivation under conditions of labour scarcity are being studied. The possibilities of higher utilization of lands by double cropping and through different rotations are also being investigated.

An important point noticed was that the programme of research is made ready a year ahead. The following were a few of the problems taken up in 1953:

Rice culture:

(1) Nursing by improved seedling bed.
(2) Reasonable planting at suitable period for varieties.

(3) Weeds control by 2-4-D.
(4) New Varieties.
(5) Suitable seeding and planting time for secondary crops after rice and cultural methods.
(6) Control of Rice Blast.
(7) Use of 'Parathion' for rice blast.
(8) Control of rats.
(9) Reclamation of weeds.
(10) Improvement of unfertile paddy seeds, etc.

In Kyoto, after a visit to the Prefectural office and preliminary study of the local conditions, most of the period was spent visiting rural areas and village organisations. The Ohara Agricultural Institute, the reclamation work in Kohima Bay and farm homes in Kojo, etc. were inspiring. The Tea Research Centre and its tea farm were also visited.

Several villages in Fuknoka Prefectures, local research stations, agricultural associations, village organisations and implement factories, etc. were also visited.

THE BACKGROUND

The total land area of the four main islands of Japan is 369,842 sq. kilometers, which is slightly larger than that of Italy and a little smaller than that of the State of California (U.S.A.). More than three-fourth of this consists of rough and rugged mountains and hills and only 14 per cent of the total land area is suitable for cultivation. Yet, everywhere, the well-kept fields, wooded mountains and picturesque gardens on slopes and terraces meet one's gaze.

Over 82 million people dwell in this small country and eke out their living by intensive cultivation of 5,048,000 hectares of arable lands which grow rice, tea, wheat and barley, vegetables and fruits, meat, mulberry for silk and timber. While population per hectare of land is 2.26, it is about 16.42 per hectare of arable land, which makes the country one of the most densely populated regions of the world. The

average holding is only about 2½ acres, while nearly 1/3rd of the holdings are one acre or even smaller. The average farm consists of about 16 individual plots in scattered tracts most of which are about 1/6th of an acre.

The climate of the country is mild and humid, the average temperature varying between 6.7°c at Ashahigawa in Hokkaido, the northern-most island and 16.9°c at Kagoshima in Kyushu, the southern-most island. The sunlight hours in the northern part are less than 180, while in the middle of Honshu these are over 240 a year.

Rainfall is abundant. The annual precipitation in Tokyo is 1952 mm. The predominance of rice cultivation is thus mainly due to the high caloric value per unit area of land, which is essential to feed a large population from a limited area, and abundant rainfall accompanied by high temperatures.

While rice is grown widely as a staple food, wheat and barley are also grown in most areas. Over one-third of the agricultural lands are double-cropped. In some of the southern prefectures that were visited, as much as 90 per cent of the land was reported to be under double-crops. In the central zone, rice seedlings are transplanted soon after winter wheat and barley are harvested. In the south-western part, wheat, barley, rape or white potatoes are generally planted on paddy fields as winter crops after rice is harvested and the field is drained. In upland areas in the south-west region, it is a common practice to grow wheat and barley as winter crops with sweet potatoes interplanted. In Kyushu, out of a total area of about 6,193,514 hectares used for agriculture about 5,048,519 hectares, *i.e.* 81 per cent of the area is used for cultivation of food crops. The rest is used for grasslands, farm houses, etc. The cultivated area is mainly in the coastal plains and valleys. In mountain districts, steep slopes, even those between 15 degrees to 30 degrees, are cultivated. Of the cultivated lands about 56.5 per cent are irrigated paddy fields, while the upland farms, mostly of poor and acid soils, occupy about 43.5% of the total area. The table below shows the wide variety of crops grown:

Crops	Planted areas in 000 hectares	Percentage to total planted area
Rice	3,011	39·4
Wheat	764	10·0
Barley	1,020	13·4
Other grains	934	12·2
Sweet Potato	398	5·2
White Potato	192	2·5
Vegetables	460	6·0
Fruits	100	1·3
Industrial Crops	251	3·3
Green Manure Crops ..	223	2·9
Feed Crops	76	1·0
Mulberry	175	2·3
Tea	27	0·4
Total planted area	7,634	100·0
Total cultivated area ..	5,048	..

It will be seen from this that food crops take precedence over all industrial crops and grain crops in turn dominate food production. The intensive utilisation of cultivable lands may also be observed from the fact that the area planted to food crops represents 155 per cent of total cultivated area. Double cropping is practised mainly in the southern region. In Kagoshima Prefecture in the southern region, the cropped area is about 203 per cent of the total cultivated area of the Prefecture, which means, practically all cultivated lands are used for double cropping. In the warmer districts, such as, Kyushu and Shikeko, paddy is grown twice a year and the winter crop is planted after the second harvest of rice. The average yield of rice is 40.3 kgs per hectare, against the world average of 16.5 kgs, and is the highest in the eastern part of the world, and 4th in the world, surpassed only by Italy, Spain and Australia. This figure, however, is the average for all rice lands, including marginal lands. The yield of rice has increased 56 per cent during the last 60 years. New suitable high-yielding varieties, heavy applications of fertilizers, timely operations and intensive interculture practices are the main factors responsible for the high yields. The

yield of wheat is, however, not as high. Wheat is mainly grown on upland fields in the northern part of the country, and on paddy fields in the central and the southern part. When wheat is grown on paddy fields, which are poorly drained, the crop is sown on ridges or raised beds. Besides ordinary field management, such as, cultivation, weeding, top dressing and spraying, the Japanese farmers practise certain unique agricultural methods, such as, tramping and mulching with soil. These practices are performed after the plants have two or three leaves. Spading is done by stepping on the soil and plants with feet. The object is to keep down the vigorous top growth and to prevent damage from heaving. Mulching is done by lifting the soil from between the rows with a perforated-bottom shovel and lightly scattering the particles over the plants so that the young plants secure more plant food. This practice also protects the young plants from the severe winter and kills late tillers thus conserving the fertilizers. It also prevents lodging.

Wheat, barley, maize, oats, rye and millets are also grown in addition to rice. Sweet potato occupies about 20 per cent of the upland area while potato is grown all over the country, mainly in Hokaido Island. Soyabean and other legumes are widely used for protein food. Soyabean is a principal summer crop and occupies about 400,000 hectares. Fruits, such as, apple, citrus, peaches, pears, are also grown widely. The total orchard area is 100,000 hectares, about 2 per cent of the cultivated land. Vegetables occupy about 416,000 hectares. The improved industrial crops are green tea, tobacco, rape, hemp, ramie, flax, sugar-beets, mat-rush *(Junces effusus)*, rezo *(Bronssonetia kazinoki)* for manufacture of high quality papers, pyrethreum and peppermint.

Owing to the scarcity of land, livestock industry has not flourished. Only two million or 40 per cent of the farms own draft cattle and 16 per cent own horses. The common breeds of draft cattle are the black types of the Island and brown Korean breeds. The number of dairy cattle is only 200,000 distributed among 133,000 farmers. Practically all dairy cattle are of Holstein breed. Hogs, sheep, goats and

chickens are other farm animals and of these the last are gaining in popularity.

Japan is said to be the largest producer of silk in the world. The production decreased during World War II due to the conversion of mulberry fields to food crops and the competition of Nylon in the market. Since 1947, the position has slightly improved. About 15 per cent of the farm families are engaged in sericulture and about 3.6 per cent of the farms have mulberry to feed the silk worm. The farmers and their families prepare silk work cases towards the end of April. It takes 4 to 5 weeks to grow these from the time of hatching to the formation of cocoon. During this period, the farmers with their families work long hours collecting mulberry leaves and feeding the worms. The silk is gathered from cocoon at the silk mills.

The major farm operations, such as, sowing, transplanting, weeding and harvesting of paddy are almost always done by hand labour. Yields per unit of labour are, therefore, low in contrast to the high yields in Western countries. Labour saving devices are, however, widely practised for interculture operations, and threshing, hulling and polishing are mostly done by machines. About 80 per cent threshing is performed by either electric or oil engines and about 8,30,000 pumping machines are now in use for irrigation and drainage. Use of power driven ploughs, sprayers, and cultivators of about 4-5 H.P., which plough about ½ hectare per hour and can also be operated by electric power, etc. is increasing rapidly.

RICE CULTIVATION IN JAPAN

Rice is the most important crop of Japan and over 83 per cent of the farmers cultivate rice on more than half of the total cultivated area of the country. Rice is grown mainly on irrigated lands and also on unirrigated upland farms, which cover about 4 per cent of the total area.

The cultivation of rice may be described under the following main heads:

(1) Selection of variety;
(2) Preparation of seed-bed;
(3) Careful selection of seed;
(4) Economy in seed-rate;
(5) Irrigation and care of the seed-bed;
(6) Preparation of land and transplanting;
(7) Manures and Fertilizers; and
(8) Cultural operations, care and harvesting.

(1) *Selection of variety:* The Central Regional and Prefectural Research Stations have evolved many high yielding varieties, which respond well to the application of fertilizers in high doses. The Research Stations have minimized the approved varieties and have established suitable types for different zones. The coarse glutinous high yielding varieties are given greater publicity than the fine varieties and are widely gorwn. Cultivators normally select one or two suitable recommended high-yielding varieties for their fields.

(2) *Preparation of the Seed-bed:* The seed-beds are prepared early in May. Good land, situated comparatively high, is selected and only about 1 se *i.e.*, just over a *katha* of land is used. The seed-bed is made about 4 ft. wide and 3 ft. high. The soil is broken to a fine condition, almost like a vegetable seed-bed, by about 4 clod crushings. F.Y.M. properly crushed, together with manure mixtures or fertilizers, is mixed into the soil. The seed-bed is prepared neatly. A little puddling is done and then water drained out by cutting drains.

(3) *Careful selection of Seed:* The seed, which is carefully preserved during the year, is now soaked in a salt solution. The seeds that float are discarded. The rest are then treated with formalin solution or 0.2% of Peronox solution or with Uspolum (Mercury Compound). In the colder regions, the seed is sprouted before sowing. In other areas, the seed is spread thinly and covered with fine pulverised soil.

(4) *Economy of Seed-rate:* Only about 3 lbs to 6 lbs of seeds are sown for transplantation in an acre of land. Much seed is, therefore, saved as compared to other countries.

(5) *Irrigation and care of the Seed-bed:* The seed-bed is irrigated every evening. B.H.C. or Bordeaux mixture is sprayed as insecticide. After about 10 to 15 days a second dose of manure mixture is used at the same rate as before sowing. The nursery is ready in about 20 days when each seed gives about 4 to 6 tillering.

(6) *Preparation of land and transplanting:* The land is ploughed after the wheat harvest. Manures and fertilizers are used before ploughing. Normally only one ploughing and two rakings are given. The field is then puddled. Transplantation is done in June. The seedlings are not pulled up but taken out by shovels without disturbing the roots. These are then planted by pushing them into mud under the water by hand. Only 2 seedlings are planted at one place. Some farmers plant even single seedling and none more than 4, which they do only when they are not satisfied with the quality of the seed. The seedlings are transplanted in straight lines for which the farmers use strings and rulers. This is an important practice as this enables cultural operations which are essential for high yields, to be carried out early. Uniformity in line and distance is insisted upon and the spacing, which varies with the soil, climate etc., is normally 9″ by 9″ row to row and plant to plant. When interculture is done by machines or bullocks the spacing given is 6″ from plant to plant and 12″ between rows.

(7) *Manures and Fertilizers:* The scientists have evolved varieties which stand high doses of manures and fertilizers. Green manuring is widely practised and soyabean constitutes the principal green manure crop in summer, while the chinese milk vetch (*Astragalus Sinicus* L.) is the main winter green manure. The manuring of paddy fields is carried out as follows:

(*i*) (*a*) *Seed-bed:* In the seed-bed about 1 cart-load of F.Y.M. is used properly crushed and pulverised. In addition, 2 parts of manure mixture for each part of seed are used and mixed well with the soil. When mixtures are not available the following fertilizers are given:

Am. Sulphate at the rate of 1,200 to 1,600 lbs per hectare.

Super Phosphate at the rate of 1,200 lbs per hectare.

Muriate of Potash at the rate of 1,800 to 1,950 lbs per hectare.

Compost at the rate of 36,900 lbs having 0.5, 0.3-P and 0.6-K per hectare.

(*b*) After 10 to 15 days a second dose of manure mixture is used in the same proportion.

(*ii*) In the field the manuring is done as follows :

(*a*) Before ploughing, manures and fertilizers are used in the following doses :

Compost : 16,400 lbs per hectare.

Nitrogen : 40 lbs to 60 lbs per hectare

Phosphate : 60 lbs to 80 lbs per hectare

For Acid soils 1,200 lbs to 1,640 lbs of lime is used per year before ploughing. When manure mixtures are available these are given instead of A/Sulphate or A/Phosphate.

(*b*) After 30 days of transplanting another dose of about 1,640 lbs of F.Y.M. compost per hectare is given which is followed by an irrigation.

(*c*) Lastly, manuring is done 23 days prior to the heading during the middle or end of October, when 40 to 60 lbs of Nitrogen per hectare through Amonium Sulphate is given around each plot beneath the top soil. Some cultivators also use balanced fertilizer mixtures.

(8) *Cultural operations, care and harvesting :* Intertillage is an important feature. Almost every 15 days the soil is stirred by hand cultivators. About 4 such weeding and mulching operations are carried out and the 2-4 D weed killer is used by some farmers. The plants are tied with a string in a line to prevent lodging and shedding. Throughout the period, the farmer keeps a constant vigil for the

proper care of the crop in every respect. Insecticides are used whenever required, the plot boundaries are maintained properly and the crop saved from animals, birds, insects and vermins. Cattle are kept away and the entire village looks after the crop in the fields, all farmers helping one another. Soon after the rice is fully headed, the fields are drained. Harvesting is done by hand, cutting straw at the surface of the ground and saving as much as possible for animal feed, bedding, fuel and making various straw products e.g., straw mats, ropes, bags, etc., which are manufactured by simple hand and power operated machines. The yield, as stated earlier, is between 3,000 lbs to 5,000 lbs per acre on the average, obtained through industrious and methodical operations. Threshing is performed either by foot-paddled or power-driven machines. Power threshers are operated by 3 to 5 H.P. oil engines or by electric motors, which can carry out threshing, de-hulling, and winnowing at the same time. Brown rice is packed in straw bags and is milled by wholesalers before it is sold to consumers.

FARM ECONOMY AND PROBLEM OF FARMERS

The total farm population of Japan is 37,810,000 scattered in 6,176,000 farm households. This is about 45 per cent of the whole population. The agricultural income constitutes about 10 per cent of the national income. The Japanese farmer, though industrious and skilful, can hardly make both ends meet from his small holdings. The majority, therefore, take to supplementary occupations. On an average, about one-third of the income of a Japanese farmer is obtained from subsidiary occupations, such as, pottery, paper-making, basketry, etc. and home processing of agricultural products. Ropes, bags and thick floor mats are made from straw and home grown rush; baskets, crates, fence splints and numerous other things are made from bamboos; silk worms are raised and, sometimes, even silk

fabrics are woven, most of these by hand and foot machines which are simple and effective; small power driven-motors are also used in many homes. The Farm Household Economic Survey, conducted by the Ministry of Agriculture and Fishery in 1950 gave out that the average net income of each farm household was $588 or 211, 657 yen (at y 360 per$) per year. This, together with taxes and living costs, showed a balance of y 18,602.

Item		Value in yen	Percentage
(*a*) Agricultural Gross Income:			
Rice	..	100,944	53
Barley and Wheat	..	18,210	10
Other Crops	..	45,930	24
Sericulture	..	5,193	3
Livestock	..	9,956	5
Others	..	8,621	5
Total	..	188,854	100
(*b*) Agricultural Cost:			
Fertilizers	..	..	25
Feeds	..	3,321	7
Seed and seedlings	..	1,390	3
Hire Labour	..	4,148	8
Depreciation	..	11,072	22
Others	..	17,837	35
Total	..	50,275	100
(*c*) Agricultural Net Income (*A-B*)	..	142,939	68
(*d*) Non Agricultural Income	..	68,718	32
(*e*) Total Net Income (*C-D*)	..	211,657	100
(*f*) Tax and Public Imposes:			
National Taxes	..	7,038	33
Prefectural taxes	..	237	1
Local Taxes	..	7,608	36
Public Imposes	..	6,269	30
Total	..	21,147	100
(*g*) Living Cost:			
Food	..	92,237	54
Housing	..	10,778	6
Clothing	..	18,786	11
Others	..	49,107	29
Total	..	171,908	100
BALANCE: $E-(F+G)$	..	18,602	..

devices are presented in a simple manner. Over 3,077 motion picture projectors and 4,515 slide projectors are in use. Motion pictures and slides are mostly made by the Extension Division of the Ministry and by the Prefectural (State) Directorates. In Extension work, as in the United States of America, particular subjects are selected at different periods and nation-wide campaigns are launched to implement the special plans over a certain period. For instance, in some areas, emphasis is laid on the extension of the high quality varieties; while, in other areas, extension work on the improvement of acid soils is taken up. Control of plant diseases, pests, clothing improvement, home improvement, use of the 'Komado' kitchen equipment is taken up widely. Farm-wife training is taken up all over the country.

The demonstration of improved varieties and techniques has given excellent results and has gained wide popularity. Such demonstrations were conducted on about 86,000 plots in 1950. Agricultural Improvement Clubs, where young men and women undertake group studies in agriculture and home improvement, are also popular features of the Extension Service. There are 16,865 such clubs with about 3,59,929 members. There are 7,668 Japanese 4-H clubs with 1,61,042 members.

The Ministry of Agriculture, under its Extension Division, has 52 training centres where farm boys live and learn farming through actual practice and short courses. Over 3,000 boys were trained in one year courses and over 30,000 in short courses. On the home improvement side, which is considered to be of fundamental importance for agricultural development, more than 128,000 farm families have reduced fuel consumption and cooking hours by the introduction of the Japanese 'Komado' cooking equipment. Farm book keeping is another activity which the Extension Service has taken up. Over 828,000 books and leaflets, prepared under the guidance of the Agricultural Association, are distributed each year.

The Extension Service is considered of vital importance by the Ministry of Agriculture for the democratic development of the country and its rural areas. This organisation is considered as the vital machinery of the Government for the development and progress of the rural areas and the rural people.

To sum up: The object of the Extension work in Japan is to increase agricultural production as well as to improve farm home life through the application of science. It gives practical education useful to farmers as well as technical advice, contributes to agricultural production, improves farm home life, helps young people to develop through club work, maintains close contact with research and experiment work, trains capable extension workers in villages and in Government, and maintains co-operative relation with the Government and the people. In short, the Extension Division of the Ministry of Agriculture is the department of the people, for the people.

PART III

CONCLUSION

"This is my home, the country, where my heart is,
Here are my hopes, my dreams, my holy shrine."

CONCLUSION

The study of the Extension work in the United States of America and Japan showed that a great nation is built in its villages, not in its cities and towns. It is in the villages that the foundations are laid for building up of a great country and it is the healthy and prosperous villagers that make a healthy and wealthy nation. Cities and towns grow later. They add to the resources of a nation but they are only the superstructures with their foundation on the solid rock of a sound village economy. Britain, and her people grew up on her green fields, and the United States of America clings to her rural homes and communities that develop her people. Japan, thriving on her industry, has achieved her greatness basically through her sturdy village folk and her sound village organisations.

It is not merely the self-sufficient village economy that builds a great and strong nation. A sound village administrative organisation is also an essential factor. If democracy is the objective, we must start at the bottom, in the village itself, in order to build a democratic nation. Parliaments and legislators may deliberate and legislate, but democracy, in its true sense and spirit, will only operate, fully and in a healthy manner, when the villages and the villagers have adopted and practised the same in their own spheres, in their own day-to-day problems and lives. Leaders may strive hard to lead but unless the villagers have developed, all their efforts will be fruitless. To build a healthy, wealthy and strong nation, we must, therefore, build first a democratic village organisation and healthy, wealthy, strong and independent villagers.

Adequate food and clothing are the essential needs for material life. It is to the production and adequate supply of food and clothing, therefore, we must turn our thoughts

first. All the rest that makes better living possible will follow once adequate food and clothing have been assured and earnings enhanced.

An independent nation is made by its independent people. The people must, therefore, learn to be independent to build themselves into a great nation. It is the principle of self-help that must be the motto. The villages that make the country and the villagers that make the nation will build a great country and an independent nation only when they learn not to be dependent and follow the philosophy of self-help. Leaders may show the path or the Government may lend a helping hand, but, it is on self-help alone, that a nation can grow.

The 'Extension Service', as we observed in the U.S.A. and in Japan, is the field educational arm of the Governments of those countries for teaching their peoples the philosophy of 'self-help'. It is the organisation for the out-of-school mass education of the rural population. It is now the largest organized out-of-school educational system in the world that prides in acquainting the rural people with the latest experimental findings and technical advice for making them self-sufficient, enhancing their incomes, improving their homes, knowledge, and levels of living.

'Extension' is not merely the dissemination of the findings of agricultural research. Farms and homes are inseparable. Without good farming and better incomes, homes cannot be made better in rural areas and without good and pleasant homes, people, healthy in body and mind, cannot grow. The Extension system is, therefore, a comprehensive programme comprising all aspects of village life.

It is true, that research and Extension must go hand in hand. The ultimate goal for any research is the extensive practice of the findings; similarly, the ultimate aim of Extension is to achieve the effective practice of the findings of research. Without sufficient materials for research, Extension is bound to be ineffective; while, without effective Extension, research would be futile. It is the Extension that must furnish problems and the research that must find solutions. Both

arms are, therefore, inseparable; and yet, they must in the nature of their functions, work separately. While research must call for concentrated attention on specific single factors, Extension demands attention to the many factors that overlap one another in daily life. Although they both aim at the same goal the very nature of their functions makes it imperative that they must grow as two distinct arms.

In the United States of America, the Extension Service is designed to serve merely as an educational agency that builds efficient rural people as opposed to an action agency. Perhaps this is a correct line of approach. But, until trade has ensured efficient service, we, in India, cannot altogether divest ourselves of action. For sometimes more, we have, therefore, to serve both as an educational agency as well as an action agency. The Extension Service should actually be such that it may represent all the nation building departments or the branches of Government for national welfare. Too many different departmental organisations in the rural areas are likely to cause confusion. Modern Extension philosophy demands a comprehensive service dealing with all the spheres of rural life and the Extension Service men are, therefore, primarily multipurpose men. The 'Extension Service' has, therefore, to be a separate branch that represents all welfare departments at the village level. The crying need for an Extension Service in the proper form can hardly be overemphasised.

In planning an Extension Service and its programme in India we must, therefore, consider the following points:

Whatever plan or programme of Extension is to be implemented, it is essential that as much share as possible should be given to the people. Wherever possible, the initiative of a plan must preferably be from the people and the Government agency should remain in the background to guide, but must not take the responsibility of direct implementation. The principle of 'self-help first' and psychological training to impress that principle, should be the first and the foremost objective of Extension work.

The narrow idea of a mere agricultural plan or an

educational plan or a health programme should now be modified and always a comprehensive plan or programme should be adopted. Such plans or programmes again should be tailored to suit individuals and particular areas, and should take into consideration the needs of the locality and should be of a nature that the local people can take part in them. The purpose of all Extension plans should be comprehensive development—economical, physical, mental and spiritual.

In India, the programmes should be of a long term nature as the people would be slow to adopt the newer ways.

It is essential to find the right kind of local people to lead in the implementation of any plan. Rural development must be a self-help movement and it must be the choice of the people, which, only a local leader can ensure.

The Extension methods to be used in India must be simple and inexpensive. Of all the methods, in my opinion, the 'Result Demonstration Method' and the audio-visual aids are of primary importance in our country. In all our plans let us begin with improvements on the existing resources and materials in the most inexpensive manner.

A village organisation and operation of the development plans mainly through this organisation and its committees is an essential need for success. Our actual objective should be to build a village co-operative in each village which, like those in Japan, will deal with every aspect of rural life. Wherever possible, we should help the people to build up this vital village organisation. In villages, where we fail to organise a co-operative society, we should begin with an association and endeavour to convert the same gradually into a co-operative society.

Above all, in India, any plan for rural development can hardly be effective without a spiritual foundation. Religion is an essential feature of rural life in this country and nothing without a touch of religion would enlist the keen support of the village elders.

In India, spiritual progress and mental bliss have always been given a higher place than material comfort and worldly

achievements. This is the land where leaders are held in great esteem not so much because they have acquired wealth or power but mainly because they have proved their strength of character to sacrifice wealth or comforts for the people or a cause. Swami Vivekananda, Mahatmaji, Jawaharlal Nehru are held in such high esteem for their sacrifices. For the development of the man in the village, as well as the rural area, the foundation of all our plans and efforts must, therefore, be spiritual. The personnel of the Extension Service must, therefore, be not merely multi-purpose men but also both temporal and spiritual leaders and yet comrades of the villagers, and, they must take up their task as a mission which they are determined to fulfil.

"Where the mind is without fear
and the head is held high;
Where knowledge is free;
Where the world has not been broken
up into fragments by narrow domestic walls;
Where words come out from the depth of truth;
Where tireless striving stretches its arms
towards perfection:
Where the clear stream of reason has not lost its way
into the dreary desert sand of dead habit;
Where the mind is led forward by Thee
into ever-widening thought and action;
Into that heaven of freedom, My Father,
Let my country awake."

Rabindranath Tagore